AMERICAN ARTISAN

WARM AIR HEATING • SHEET METAL CONTRACTING • AIR CONDITIONING

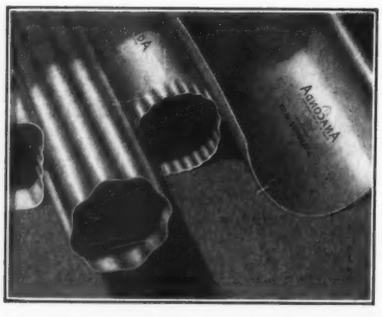
ABLISHED
8 8 0

AY 23,
1932

ANACONDA
from mine to consumer

"Now...they're sold on Copper"

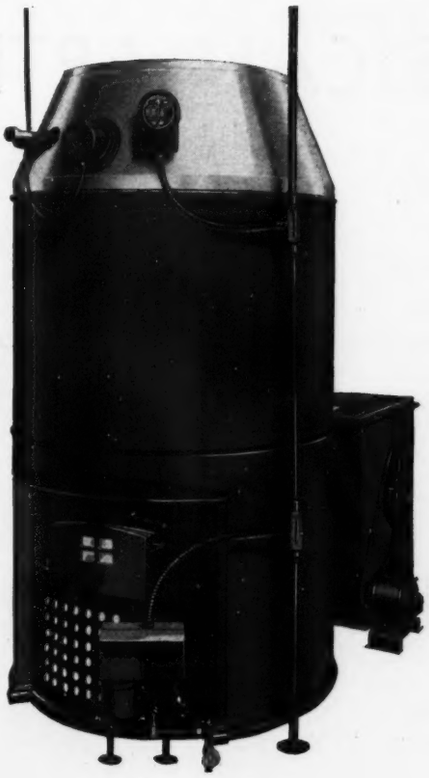
"After spending more money for repairs than they 'saved' by using rustable metal, they are sold on Copper sheet metal work."



Most home builders and owners know that metal that rusts sooner or later causes expense. They know, too, that Copper *cannot* rust . . . that the name "Anaconda" stamped in the metal means quality safeguarded throughout manufacture. It is worth your while to capitalize this public acceptance.

Leading sheet metal supply houses carry Anaconda Copper in sheets, rolls and Economy strips, and Copper gutters, leaders, elbows and shoes trade-marked Anaconda. The American Brass Company, General Offices: Waterbury, Connecticut.

ANACONDA COPPER



In Hottest Summer Dealers Sell

MW "WEATHER CONTROL UNITS"

Right in June and July, when heating plants are farthest from home owners' minds—you, too, can put *life and pep into your business* by selling the famous MW "Weather Control Units."

Explain to home owners how the MW "Weather Control Unit" literally means the creation of indoor weather, the control of temperature, cleanliness, and the movement of properly conditioned air *in summer* as well as in winter—

. . . show how uniform temperature is insured by the setting of a thermostat—how stagnant summer heat is simply *driven* from rooms by positive blower action—

. . . make clear how the MW "Weather Control Unit" is quickly connected to present wall ducts—how these winter-warming, *summer-cooling* results are provided automatically, efficiently, quietly, economically . . .

. . . and you'll have MID-SUMMER SALES AND PROFITS!

Write for details of our interesting dealer franchise—for literature describing our complete line including the latest sensation, the New MW Boiler Unit and Unique MW Gyro-Flame Self-Stabilizing Burner

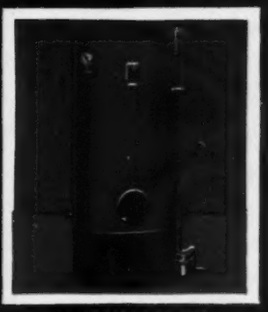
OIL BURNING **MW** AUTOMATIC

WEATHER CONTROL UNITS

Products That Sell Spring, Summer, Fall, Winter

MW WEATHER CONTROL UNITS
Warm air in winter, cool air in summer. A summer seller of low cost and economical upkeep. —Listed as Standard by Underwriters' Laboratories.

MW AUTOMATIC WATER HEATERS
Domestic and commercial sizes. Homes, apartments, office buildings, schools, factories. An all-year market. —Listed as Standard by Underwriters' Laboratories.



MW BOILER UNITS
Steam or Hot-Water Heating, for Summer, Fall and Winter Selling. Low price and economical upkeep. —Listed as Standard by Underwriters' Laboratories.

MW Fuel-Oil Burning COOKING RANGES
For residence kitchens. For restaurants, lunchrooms, roadside stands, hotels, clubs, and other locations.

MOTOR WHEEL CORPORATION, Heating Division, Lansing, Mich.

Covering All Activities
in
Gravity Warm Air Heating
Forced Warm Air Heating
Sheet Metal Contracting
Air Conditioning
Merchandising
Ventilating

AMERICAN ARTISAN

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Entered as second-class matter, January 29, 1930, at the Post office at Chicago, Illinois, under the act of March 3, 1879. Formerly entered on June 25, 1887, as American Artisan and Hardware Record

Today's Problem

LAZY smoke stacks are a symbol of today's business problem. They indicate a business condition that encourages low stocks on hand, holds up production and raw material schedules and invites hurry-up, last-minute orders.

Granite City Steel Co. meets today's problem perfectly for the sheet steel jobber. Adequate warehouse stocks of sheets and plates are ready for immediate shipment from Granite City. And the location of Granite City Steel Co., only 20 minutes from Saint Louis, and served by 29 railroads and the Mississippi River, assures better service to the Mississippi Valley, the West, and the Southwest.

Chicago, Dallas
Kansas City

SINCE
GRANITE CITY STEEL
1878

St. Louis, St. Paul
Salt Lake City

GALVANIZED SHEETS
STEEL SHEETS
PLATES AND
TIN PLATE

•

GRANITE CITY STEEL CO
GRANITE CITY, ILLINOIS

I. W. Rowell, Manager, Lakeside Company, has been a leading figure in the pioneering and development of Air Conditioning Equipment for residences, etc. The leadership of his company in air conditioning has placed him on committees of national importance in this field.

Opportunity

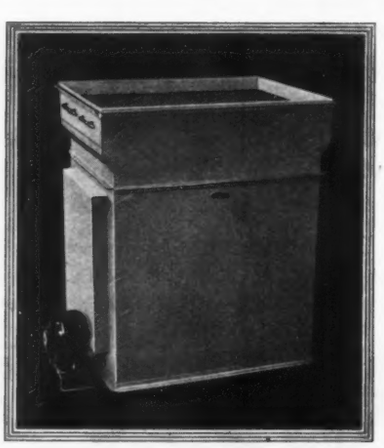
IS ALMOST BATTERING DOWN YOUR DOOR! — *Will You Let Her In?*

"LOOK back on America's industrial history, and you will find that the great fortunes were amassed by the men whose foresight recognized the tremendous possibilities in new ideas and NEW INDUSTRIES —when the ideas and the industries were NEW. Those who were too skeptical or too hesitant trailed along later to gather what they could of the leavings.

"Today's great opportunity is AIR CONDITIONING. Those who wait for buyers to ask them for air conditioning will be still left at the post when the aggressive merchandisers, the fighters-for-business, the thinkers and the workers are already 'in the money.'

"The heating engineer, the sheet metal worker, the furnace manufacturer and the heating equipment jobber have never had so great an opportunity for LEADERSHIP and for PROFIT.

"The foresight, initiative and aggressiveness of Lakeside Company has played a vital part in the pioneering and development of AIR CONDITIONING and we stand ready to assist all those who recognize OPPORTUNITY and are willing to open their doors to her."



J. W. Rowell

Manager, Lakeside Company

Furblo

AIR CONDITIONING EQUIPMENT

LAKESIDE COMPANY • • • • • HERMANSVILLE • MICH.

VOLUME 101

AMERICAN ARTISAN

NUMBER 11

WARM AIR HEATING • SHEET METAL CONTRACTING • AIR CONDITIONING

American Artisan To Be Published Monthly

BEGINNING with the next issue, American Artisan becomes a monthly publication. The first monthly edition will appear June 18.

This change marks another important step in the program of betterment evolved at the time American Artisan became affiliated with Engineering Publications, Inc.

A number of very serious reasons lie behind this change in our publication schedule. When the first change was made, consisting of an approximate 100 per cent increase in the number of editorial pages per issue, it was realized that this increase, to be of utmost value, must be made under a very definite program of just what material should be published.

For example, air conditioning is on everyone's tongue. Literally hundreds of thousands of words have been published on various phases of air conditioning, but without much consideration to continuity. As a result, most heating men have a vast fund of uncorrelated information which is valuable, but useless, until the missing material can be filled in.

To correlate the material on air conditioning alone requires, as any reader can well understand, a great deal of time and study in reviewing what has been published, what should be published and what must be published to give readers a connected picture. Under the schedule of one issue every two weeks far too little time for serious consideration of the problem as a whole would be available.

Practically the same situation exists in the fields of ventilation, sheet metal fabrication, metal specialty manufacture, gravity heating, and merchandising. Each of these fields must be served fully and time found to consider their problems.

The subject of merchandising requires attention. Under a merchandising editor, that department will bring to our readers selling helps that will fill a need sorely felt by the contractor. Already we have published a complete campaign on cleaning—completed in this issue—and there is in preparation a year's program of merchandising helps to meet seasonal requirements.

These developments, as we see them, demand a type of publication service which has not heretofore been contemplated. More subjects must be covered; more time must be taken to collect and weigh and compare facts. Times like these bring great changes, and it is our goal to keep the alert reader of AMERICAN ARTISAN fully informed so that he may take advantage of every trend, of every new opportunity for business, and so find himself, when business improves, in a position to work profitably in every market that is open to him.

We "go monthly," then, to serve you—the reader—with an increased editorial content, ranging over all of the subjects that are and will be of vital interest to you in the operation of your business.

West Virginia Capitol and Its Lead Coated Copper Dome

AGAINST a background of rolling, wooded hills and a sweep of the Great Kanawha River, a new capitol building group has just been completed in Charleston, West Virginia, to replace the older building destroyed by fire several years ago. The magnificent buildings have been declared by architects one of the finest and most imposing groups of its kind in the world. The architecture is the work of Cass Gilbert, New York architect, with the general contract let to the George A. Fuller Company.

The buildings form a square U around a central court. The main building is more than 550 feet long and 125 feet deep. Above the center rises a magnificent dome, strikingly similar to the dome of St. Paul's Cathedral in London. The eagle which tops the finial is 288 feet above the entrance steps.

By far the most impressive feature of the building aside from the general architecture is the copper ornamentation and protection. On this building more than 80,000 pounds of lead coated copper was used. All of this copper application was done by the E. Van Noorden Company of Boston, for more than 60 years specialists in work of this character.

The West Virginia State Capitol Building is declared one of the most imposing buildings of its type in the country. The dominating feature is the lead-coated copper dome with its heavy enrichment. This article describes the major details and illustrates some of the points of importance.

Straight copper application was fabricated by the Van Noorden company, but the metal stampings used for the ornamentation are the work of Miller and Doing, Inc., of Brooklyn, under the Van Noorden contract.

The Dome

The photograph of the exterior and the closeups of the dome show plainly why this copper clad section is the dominating feature of the buildings. The copper work begins at the base of the dome where the diameter is 75 feet and extends for 110 feet to the tip of the finial.

How intricate and ornate is this part of the copper contract is illustrated in the photograph of the dome taken from the roof. The copper is covered in gold leaf to

form a striking color contrast to the wooded hills across the river.

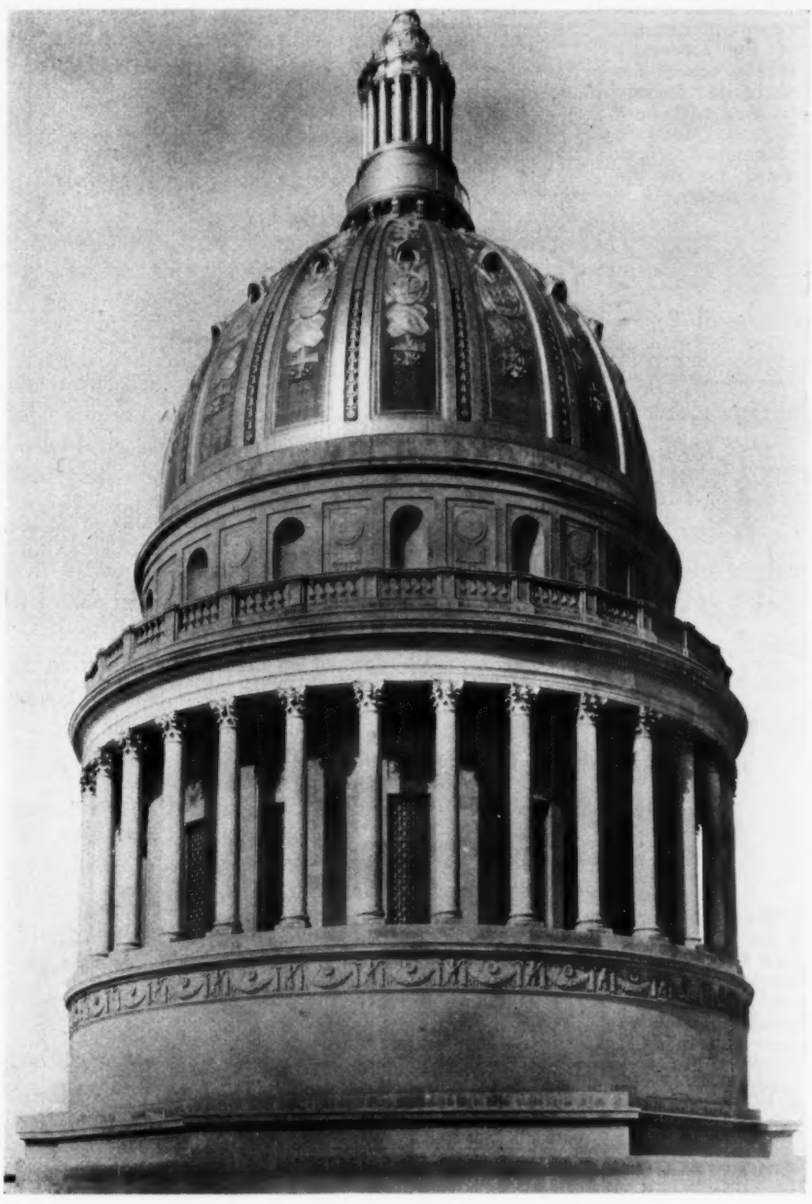
Looking on the plan of the dome there are 16 sunk panels each with shield ornamentations, an eye-brow window and an eagle ornamentation above each window. Each one of these panels is composed of leaded copper sheets curved to the curve of the dome and locked to the adjoining sheets. The ornamentations are stampings of heavy leaded copper and are backed and supported by metal brackets.

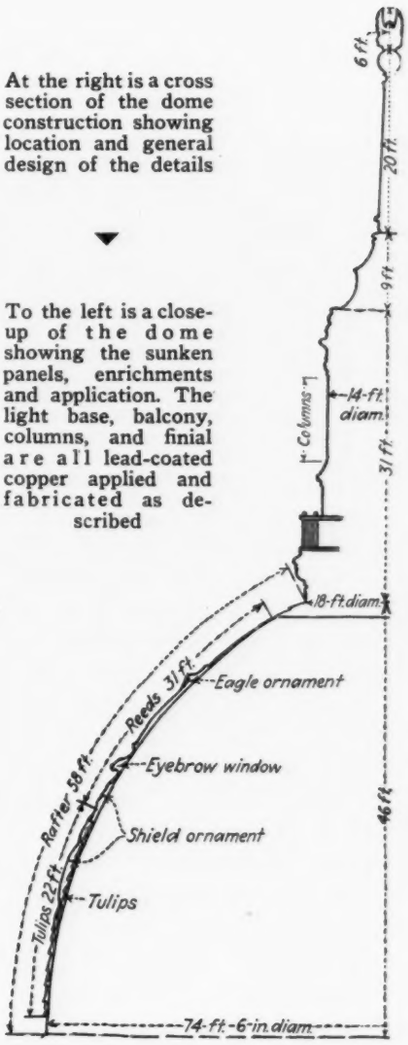
Between each two of these panels is another type of panel consisting of flat ribs with a central sinkage, all of which is constructed of leaded copper sheets. The sinkage is ornamented by stamped leaded copper tulips and reeds.

All the stampings are very bold. The tulips are approximately 5 inches deep. The copper work starts at the base of the curved portion of the dome which is a foot or two below the bottom of the tulip ornamentation. The curved rafter from the foot of the copper work to the underside of the balcony above, that is the balcony which has the iron railing around it, is approximately 58 feet. The circular cornice and supporting brackets immediately below this balcony, as well as the entire lantern, including columns and cornice features above it, are all leaded copper right up to the top of the eagle finial. The height of lantern above dome to the top of the eagle is 66 feet, from the top of the eagle to the bottom of finial mast is 26 feet, from the top of the eagle to the bottom of the dome is 112 feet.

At the right is a cross section of the dome construction showing location and general design of the details

To the left is a close-up of the dome showing the sunken panels, enrichments and application. The light base, balcony, columns, and finial are all lead-coated copper applied and fabricated as described

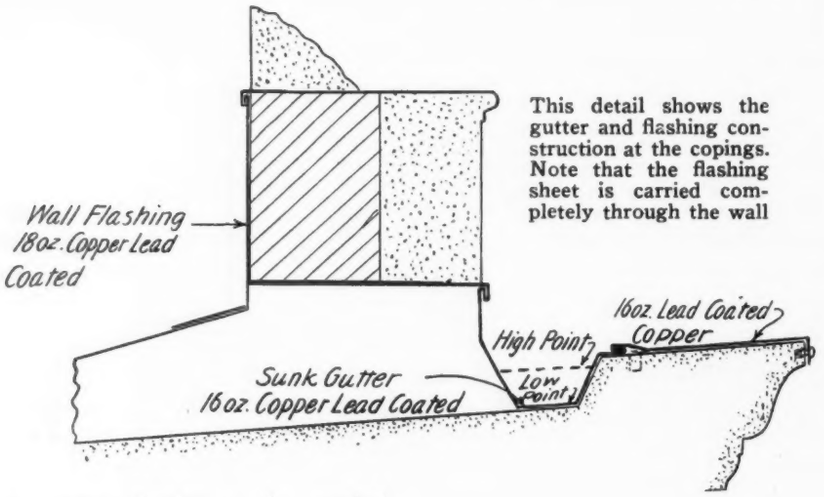




Monel metal nails were used for fastening the copper work to the concrete, all copper being cleated down so that no nails penetrate the face of the copper. Only the stampings were done by Miller & Doing, and as far as we know, the copper was lead-coated after stamping. The Wheeling Metal & Mfg. Company lead-coated the sheets for the dome.

Copper Protection

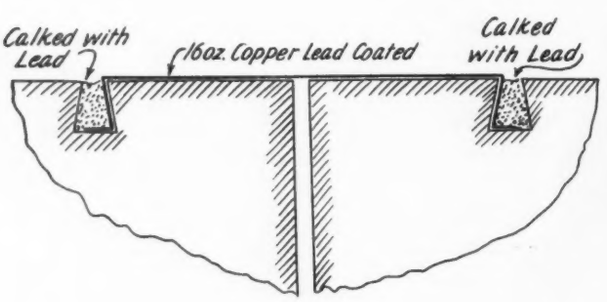
All of the clerestory and parapet walls are flashed with lead-coated copper which is carried clear through the walls. One of the details shows how this copper work was carried out. As indicated on the drawing,



This detail shows the gutter and flashing construction at the copings. Note that the flashing sheet is carried completely through the wall

the copper begins at the vertical face of the stone cornice, is carried down and across the gutter behind the cornice as the second sheet. The lock is made on the top of the cornice with the joint soldered. Another copper sheet is carried up the outside face of the coping and across the top of the first stone course. Behind the coping another sheet is locked at the angle and carried down the back face and under the roofing. All the roofing on these buildings, by the way, was also contracted to the Van Noorden company.

The gutter is drained inside the walls from low points along the bottom.

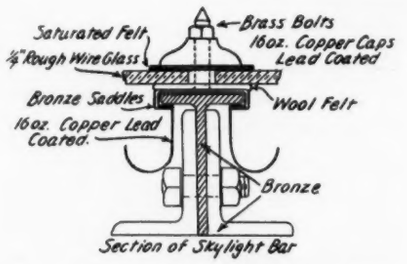


To the left is a detail of the stone coping joint protection. Each joint has a calked sheet like this

All joints in the stone cornice around the decks are flashed for water penetration elimination by short lead-coated copper sheets caulked into reglets as shown on another detail. Each section is about 6 inches long or long enough to extend some 3 inches on each side of the mortar joint.

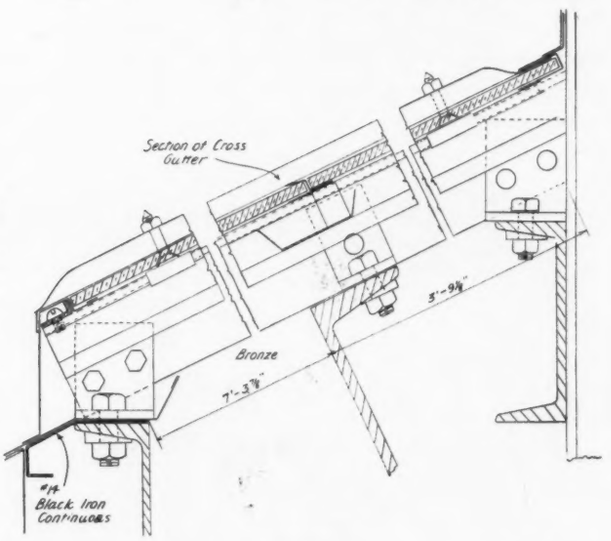
Skylights

At each end of the main wing there is an assembly hall for the state senate and house of representatives. Light is admitted to these



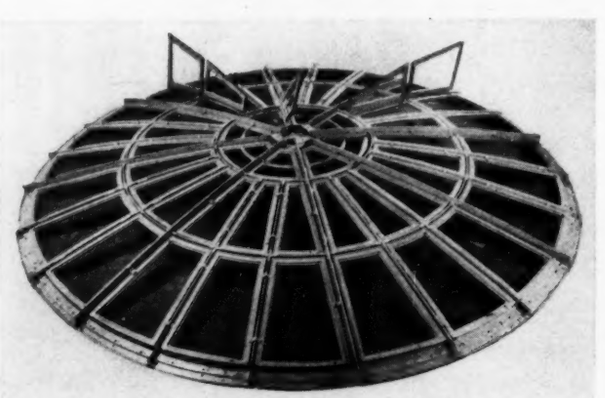
Cross section of a skylight bar showing assembly and design

chambers through large skylights some 37 feet square. The skylights are of Vanco Duratite non-corrosive construction with all bronze framing and lead-coated copper sheathing. Wire glass is used on the outside with dome-shaped ceiling lights of steel and cathedral glass below. Opening lights in the ceiling lights are counterbalanced and controlled in series.



This detail shows the construction of the exterior face of one of the skylights. Bronze framing with glass is used. Moisture elimination is provided for in the design

The construction of one of these inside domes is shown in one of the details. Each individual section is hinged to open for ventilation and for cleaning. Molded sheet metal trim is used on the under side with glazed glass.



To the right is one of the inner skylight frames. Panels swing upward for cleaning. Leaded glass is carried in the bronze frame with sheet lead trim

A Cleaning Campaign —for Profit!

NOW we swing into the last lap of our campaign for cleaning at a profit. Before we go into the things suggested in this closing article, it might be well to say a word about the idea of merchandising generally.

The retailer today—no matter what line of work he follows—is up against a "Hobson's choice." There is no other horse in the stable which he can ride, excepting only that one called merchandising. The riotous (and not always profitable) years of volume building are behind and ahead of us. What is left is the existing home.

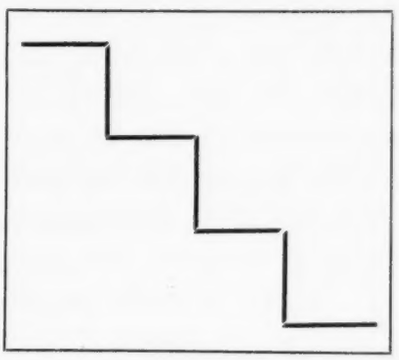
You Must Merchandise

Circumstances have thus made it necessary for the retailer to merchandise. Volume is not seeking him just now—and the average home owner usually lets repairs on mechanical equipment go until he has to have them made. So that the furnace dealer who would secure a comfortable volume of business, at a proper price, must merchandise his service and its quality and so call the attention of the home owner to those things which need doing now.

These few prefacing remarks are made because, while one may sympathize with the man who would rather bite into a technical problem than a business problem, he really hasn't any choice. Regard the activities of any retailer in your own community and you will note that he has gone in for merchandising on one form or another. He redresses his windows more often, he calls the attention of his public to the better values he has to offer today, he is sending out letters or circulars, he is using his telephone. If he isn't doing these things, he's passing out of the picture.

Newspaper Copy

With this article we show four pieces of copy for single-column newspaper advertisements. They may be used just as they appear here—merely clip out the ad or ads you want to run and hand them to your local paper. Or, if you want to use larger space, and have an illustration that fits the copy, your local paper will help you in laying out the larger space.



Believe it or not, that's a chart. . . . We could make it a lot more complicated, of course, but the general idea is that you get less and less heat from the fuel you burn as there is more and more soot deposited on the heating surfaces in your furnace.

Phone 0000
for our special furnace cleaning offer

Good only until June 1

(Your name and address)

This is a single column newspaper advertisement which makes no attempt to be intricate, but uses a very simple chart for one purpose—attracting attention. The copy ties into the idea of fuel saving used in other types of publicity

The economy theme—which has appeared in all of the material suggested thus far for the campaign—appears here again, so that there is a definite tie-up between the sales letters and the circular in the article which was in our May 9th issue. This, by the way, is an important thing to remember about any campaign: Select some one central thought that is stressed throughout the campaign, in whatever type of literature you use. If this is done, and some similarity of appearance is maintained between the various pieces of advertising, you secure the full value of repetition.

Three Sample Ads

Three of the newspaper advertisements suggested have a semi-humorous approach. The chart, the "Let X" copy, and the comparison of cleanliness in furnaces and human beings have that touch of humor so that the reader is into the copy, and has been given the economy message, almost before he realizes that he has taken the time to read the copy. The fourth is simply a direct statement of the economy appeal.

If it is true that the mailing piece must be unusual in order to compete with other mailing pieces that may be placed in the box at the same time, it is even more true of the newspaper advertisement. It must compete with the news and with the other advertisements which may appear on the page with it. Some of the news, and some of the advertisements, may be sensational in character. We feel, in view of these circumstances, that brief copy and a non-sensational way of stating the message of economy through cleaning, will be most effective. In the merchandising field just now, particularly, there is a tendency for

Cleanliness—

It's next to godliness in human beings, and it's next to economy in furnaces. If a human being loses self-respect by being dirty, a furnace loses efficiency for the same reason —and it costs you more money to warm your home.

That's why we are making a special furnace cleaning offer now

Phone 0000 for particulars

(Your name and address)

Most home owners understand cleanliness of person and of equipment. This advertisement attempts to capitalize this understanding by calling attention to the need for a clean furnace

screaming headlines and for setting reduced prices in big, black type. Against such advertising the furnace dealer, working in smaller space, can not hope to compete in the same manner. But by "shifting gears," so to speak, and using a quietly humorous approach with short copy, he may have a very reasonable hope that what he has to say will be read, and will be remembered.

The Inspection Report

The other feature in this article is the suggested "inspection report." Too many retailers have a tendency to hope that the job they have done with direct mail advertising, or with newspaper copy, or both, will complete the selling job. This is not true in the majority of cases. Such advertising is meant to produce inquiries by putting the prospect in the frame of mind where he is interested.

WHAT DEVELOPS FROM SUCH INQUIRIES IS ENTIRELY UP TO THE DEALER, WHO CAN EXERCISE A GREAT DEAL OF INFLUENCE AFTER THE INQUIRY IS MADE.

Let us suppose that you receive a number of calls for cleaning. You do not want to stop there. When one of your mechanics gets into a home to do a cleaning job, or a small repair job, that small job should be only the beginning. He has the opportunity to look over the entire heating plant—and that is a privilege many another industry would give a great deal to have. The results of his observations should be put down immediately for your use; and in order that they may be accurate, the mechanic should have a form like the inspection report shown. Then he will not be depending upon his memory of a day's work, in which he may have been in five or six homes. And you will have a dependable source of information for your own contact with the home owner to report on the general condition of the heating plant.

The most successful use of such information, as developed by the experience of a number of heating men, is this: They look over the inspection report. When they have checked any further work or repairs that may be needed, they make a call just to make certain that the work already done has been satisfactory. While making that check-up call, they have the opportunity to point out to the home owner the fact that the mechanic has reported certain other repairs or adjustments necessary.

Use the Report

In addition to this, where the dealer is keeping a good prospect file it will be possible for him to

It will cost you less now (because of our special offer) to include the cleaning of the furnace in your spring cleaning than to go into the next heating season with last winter's soot still on your furnace castings.

Phone 0000 for our special furnace cleaning offer

(Your name and address)

Other pieces of mailing matter have stressed the need for a clean furnace during the summer when metal suffers from neglect. This ad carries on this thought

Let X= the amount of soot now deposited on your furnace castings—

and as sure as you're a foot high, Y will equal the amount of fuel you wasted last winter.

Phone 0000 NOW for our special offer for cleaning your furnace

(Your name and address)

Semi-humorous copy has been found a good way to attract attention when the space bought is small. This ad makes use of this appeal

INSPECTION REPORT

Owner Henry A. Jones Address 1129 Main St.
Salesman John G Green Date of Inspection 5-4-32
Call Again 5-12-32

ITEM	CONDITION	WHAT IS NEEDED	COST ESTIMATE
Grates	Fair	1 bar	$4.00
Fire Pot	ok.		
Combustion Chamber	O.K.		
Ash Pit Section	O.K.		
Radiator	O.K.		
Smoke Pipe	Bad	all new pipe	$11.00
Smoke Pipe Damper	Warped	new damper	$1.75
Smoke Pipe Thimble	O.K.		
Damper	O.K.		
Check	O.K.		
Chains and Pulleys	Fair		
Water Pan	Caked	cleaned	$1.00
Front Casting	Rusty	paint	no charge
Casing	O.K.		
Casing Rings and Base	O.K.		
Bonnet	O.K.		
Register Faces	old Style	new faces	?
Return Air Faces	wood	steel grilles	?
Warm Air Leaders	Dirty	new paper	$5.00
Return Air Ducts	O.K.		
System in General	Shy on C.A.	see note	

Note - Should have one C. A. in rear pantry which is N.W. also C.A. in dining room which is north. Furnace about 11 yrs old. Should have auto controls as owner reports trouble holding temperature at 70°

An inspection card should be one of the most important things used in your campaign. When these reports are filled in the information can be used for year 'round solicitation for accessories and repairs the owner needs. Some variations can be used, of course. We suggest a sheet about 5 by 7 inches or less depending on your filing system

note on the prospect cards just what the sales possibilities in any home in his community may be. Then, when the proper season rolls around, or when, perhaps, a manufacturer has made the right literature available, he can pick out those names in need of that particular service or product, and work more effectively with them because he will be able, from his records, to point to a definite need.

It might be well in this closing article on the cleaning campaign to outline what we mean by a "campaign," since we shall be furnishing just such merchandising information for every phase of warm air heating and sheet metal work as the months roll along.

The Campaign Idea

Fundamentally, a campaign is a plan of action, with certain objectives in view. The objective in an advertising campaign is inquiries and sales. But we do not want any reader of AMERICAN ARTISAN to get the idea that when we begin talking about campaigns we are talking about something that is elaborate, or expensive.

You may put on a campaign for a week, and with the intention of reaching only ten people. For example, if you know of ten people who should have thermostatic equipment in their homes, and you decide to go after them with a view to selling that equipment, you would lay out a plan of action. You'd send them a letter or two, a circular or two, perhaps make a telephone call, and follow that up with a personal call. That's a campaign—it's a plan of action with a definite objective in view.

So, as we present these campaigns of ours, it will be well to remember that we are going to remember the limitations under which the retailer works, and we aren't going to ask him to take on anything but a common-sense plan of action, for a definite purpose, and one that will be well within his personal and financial capacities.

This article concludes our campaign on cleaning. We have tried to show that any cleaning campaign—for profit—is well worth all the time and attention required to make the campaign thorough. If you are serious about getting cleaning business you should use just as many of the forms of solicitation we have outlined as your finances will permit. The more approaches to the owner you can make, the better the chance of success your campaign will have. Any questions you have on the information presented will be answered.

INFILTRATION—

A discussion of its effect on heat loss in buildings

By **EDWARD ROOT**

Address at Forced Warm Air Short Course, Michigan State College

IN calculating the heating requirements for buildings with non-weatherstripped doors and windows, it has been the practice to consider the subject of INFILTRATION as one of minor importance. In the following discussion, I shall endeavor to show that the part required to heat inleaking air to room temperature is a large percentage of the total requirements. This being true, the subject becomes one of major importance.

In order to determine this heat loss, it is first necessary to determine the sources of infiltration and contributing factors. Air leaks into a building because of the difference of pressure outside of the building and pressure inside of the building. This pressure difference is due to wind velocity and inside temperature.

Where Leaks Occur

It has been determined by laboratory tests that the principal sources of air leakage are through walls, through windows, and through doors; and the contributing factors are wind velocity, direction of prevailing winds, and amount of crack. It is common engineering practice to use the average wind velocity during the three coldest months of the year, which are January, February and March. The average wind velocity, as compiled from the Weather Bureau Records for Michigan during these months, ranges from 11.3 miles per hour to 13.1 miles per hour. For practical purposes we will assume a velocity of 15 miles per hour, which is sufficiently high to include a factor of safety for cases where we must guess at velocity.

Infiltration through walls under average conditions is so small as to be negligible. There are certain types of construction, however, where it is necessary to compute the amount of infiltration from this source, as will be noted from the following table.

TABLE 1

Infiltration Through Walls Expressed in Cu. Ft. Per Hr. Per Sq. Ft. of Wall

	Plain	Plastered
8½" Brick wall.....	7.85	.066
13" Brick wall.....	7.48	.025
Frame wall (standard construction)		.13

From Table 1 we note that the infiltration through an 8½-inch brick wall without plaster amounts to 7.85 cu. ft. of air per hour per square foot of wall. If it requires .018 B.t.u. to raise the temperature of one cubic foot of air one degree, then the B.t.u. requirements to raise the temperature of the "inleaking" air through an 8½-inch solid brick wall without plaster per degree temperature difference would be equivalent to $7.85 \times .018$ or .14, which is 36% of the conduction loss through the same wall. The importance of including the infiltration through unplastered brick walls is therefore obvious.

Window Infiltration

This source of heat loss, namely, infiltration through windows, should not be confused with conduction loss through windows. There has been some confusion at this point for the reason that, in determining the conduction loss through doors and windows, many have been under the impression that the total heat loss from these sources had been accounted for.

Elaborate tests have determined that the principal sources of inleaking air through windows are two; namely, leakage around frame and leakage around sash. The leakage around frames can be stopped by properly calking the frames, and in such cases this factor may be ignored. The inleaking air around windows is further determined by direction of prevailing winds. If there are three sides of a room exposed, the maximum amount of infiltration would be determined by computing the amount of air leakage through the windows on the two windward sides of the room.

Amount of Infiltration

The amount of infiltration in cubic feet per hour per foot of crack differs according to type and construction of windows. For practical purposes we will limit our discussion to the most commonly used types of windows, namely, double hung wood sash, double hung steel sash and rolled section steel sash. The latter type bears the trade name of "Industrial Pivoted" and "Residential Casement." The industrial pivoted window is generally employed in industrial buildings. The ventilators are pivoted, usually horizontally slightly above the center, the lower part of the ventilator swinging out and the upper part swinging in. Because of this construction, the air leakage is much greater than in the case of the Residential Casement.

For window and sash leakage, the length of crack in double hung windows is equal to the perimeter of sash plus length of meeting rail; in other words, twice the height of the sash plus three times the width of the sash. For rolled section steel

TABLE 2

Air Changes Under Average Conditions

Kind of Room	Number of Air Changes Taking Place Per Hour
Rooms, 1 side exposed	1
Rooms, 2 sides exposed	1½
Rooms, 3 sides exposed	2
Rooms with no windows or outside doors	½ to ¾
Entrance Halls	2 to 3
Reception Rooms	2
Living Rooms	1 to 2
Dining Rooms	1 to 2
Bath Rooms	2
Churches	½ to 3

sash, the length of sash crack is dependent on the amount of ventilation, the number of ventilators, etc., so that its length is equal to the perimeter of the vents or movable portions. Since the members are assembled with mastic, no other crack exists.

Door and Casement Infiltration

Casement windows and doors differ from double hung windows in that their position is fixed in the opening, whereas double hung windows are free to move from side to side or backward and forward between the stops with wind pressure. The fixed position permits every crack around the window or door to be a different width. For practical purposes we will assume the casement windows and doors to be built according to standard practice, allowing crack for single casement windows and doors as follows:

Top, lock side and hinge side	1/16-in.
Bottom	1/8-in.

Tests indicate that the infiltration for doors and casement windows constructed according to these measurements may be assumed to be twice that of window cracks, or an air leakage of 290 cubic feet per hour per foot of crack. Allowing 20% reduction for inside pressure, this leakage is reduced to 231 cu. ft. per hour in actual practice. A further reduction could be made, due to the fact that the pressure difference in the tests represents a definite wind velocity at right angles to the wind, whereas under average conditions the wind hits the window more or less obliquely.

Air Change Method

The amount of air leakage is sometimes roughly estimated by assuming a certain number of air changes per hour for each room, the number of changes being dependent upon the type, use and location of the room. The following table will indicate the number of air changes recommended where this method is used: **[Table 2]**.

This method is inaccurate for the reason that it does not take into consideration the number of windows or doors in the various rooms, and there are instances where there is more infiltration in a room with one side exposed than there might be in another room with two sides exposed.

The Standard Code method uses the Air Change Method with the necessary conversion factors. Blower systems demand greater accuracy for the reason that a blower will handle between four and five times as much air as a gravity system, and an error in a gravity system would be multiplied by the use of a blower unless necessary corrections were made.

There has been some confusion in the use of the term "Air Change" as related to infiltration and "Air Change" in connection with the use of blowers for recirculation of air.

"Air Change" as related to infiltration is a term used to indicate the amount of air in cubic feet per hour which leaks into the room or building around the cracks of doors and windows, and has no relation to the use of a blower.

"Air Change" as related to the use of a blower is a term used to indicate the amount of air in cubic feet per hour which will recirculate through the heating plant to the various rooms at the required temperature to offset the heat loss in these rooms.

The values given in the tables are from tests, and it is admitted that they are probably somewhat high due to the fact that the pressure difference in the tests represents a definite wind velocity at right angles to the window or surface being tested. The following table **[Table 3]** summarizes the various tables, assuming that the doors and windows are well constructed instead of poorly constructed.

TABLE 3

Summary of Infiltration Through Various Sources

Type of Opening	Type of Construction	Wind Velocity in Miles Per Hour 10	15
Double Hung Wood Sash	Around sash, 1/32" crack Non-weatherstripped	31	45
	Average weatherstripped	11.7	22.9
Double Hung Metal Windows	Non-weatherstripped	45	70
	Weatherstripped	19	32
Rolled Section Steel Sash	Industrial pivoted 1/16"	108	176
	Residential casement 1/32"	32	52
	Heavy casement projected	24	38
Wood Casement Windows (Single)	Fixed position painted (Estimated)	12	25
Double Windows (Single)	Hinged Non-weatherstripped	142	200
	Hinged Weatherstripped	12	25
Double Inswinging Casement Windows	Meeting rail 1/8" Other cracks 1/16" Plain	100	150
	Weatherstripped	12	25
Doors	Plain 1/16" Top and Sides 1/8" Bottom	142	200
	Weatherstripped	12	25

Design As You Would in Your Own Home and Your Jobs Will Sell For You!

IT pays, L. E. Heeks, heating engineer with A. J. Magoon & Son, Providence, R. I., insists, to spend plenty of time and take lots of care in planning a warm air heating installation. If everything goes right and the installation gives entire satisfaction, it will sell other installations. If it is not entirely satisfactory then it makes it just that much harder to make sales in the future.

Mr. Heeks firmly believes that nine-tenths of the success he has had in selling warm air heating has been due to the care taken in planning each installation that he has sold. He knows before any work is done that the installation will prove satisfactory and that each installation can be counted upon to sell at least one other installation sooner or later.

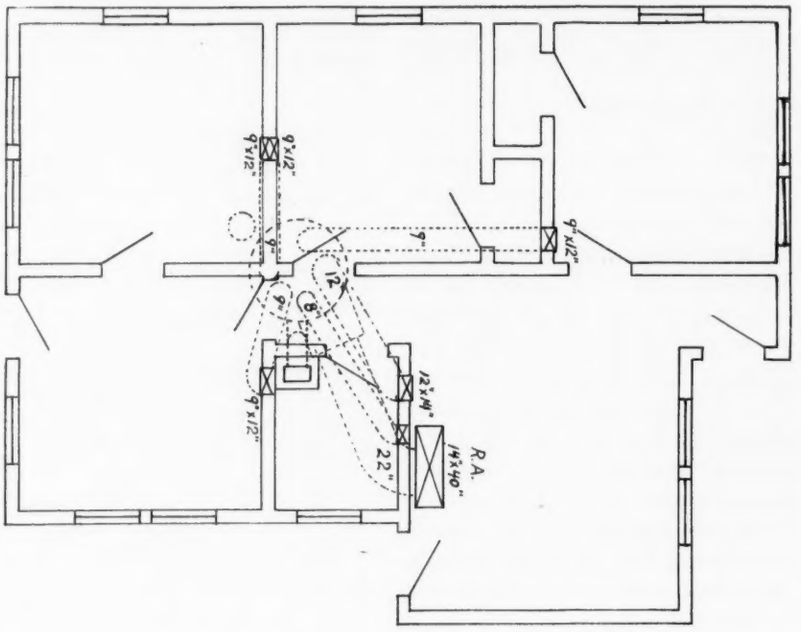
When Mr. Heeks had a five room bungalow built for himself, he had it planned to make it easy to install a warm air heating system that would give highly efficient results. The house itself, on account of the large window area and three outside doors with no vestibules, required careful planning but proper location of the furnace and liberal sizes of pipes used has made it possible to heat the house in the coldest, windiest weather with a low consumption of coal.

Above—This is the exterior of L. E. Heeks' own home. It was in this house that the heating plant described was installed

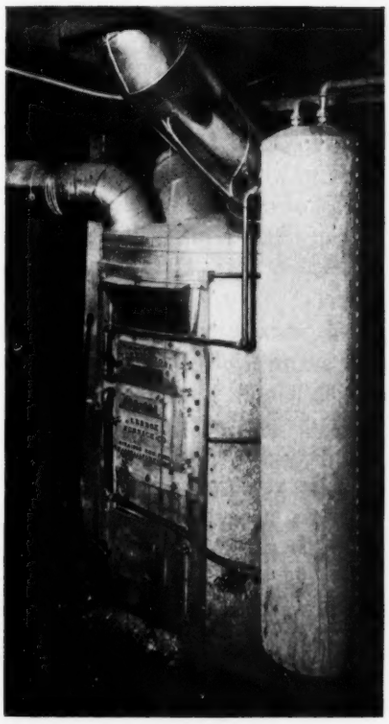
House Design

The house has five rooms and a bath. There is an outside chimney but the furnace flue, 8x13 inches, has no other connections. The fireplace is connected to another flue in the chimney.

The furnace itself, a Torrid Zone with a rating of 673 square inches of heating surface, is installed in the center of the basement. All leader pipes are short. This practice, says Mr. Heeks, saves on material thus lowering the cost of installation and results in very much



Below—The heating system installed in Mr. Heeks' house. The layout is extremely simple and compact. Note that only one return air is used, located near the most used outside door.



This shows the furnace in Mr. Heeks' house. The furnace is placed right at the end of the basement excavation.

better heating. A single cold air return located in the living room is used.

All registers are of the baseboard wall type. The warm air pipe to the living room is 12 inches in diameter, a 10-inch pipe supplies heat to the two bedrooms, and 8-inch pipe to the bathroom and a 9-inch pipe to the kitchen. The return pipe is 22 inches in diameter.

This heating plant in Mr. Heeks' house worked so efficiently that it attracted the attention of Leo S. Girard, a Pawtucket, R. I., building contractor.

Another Example

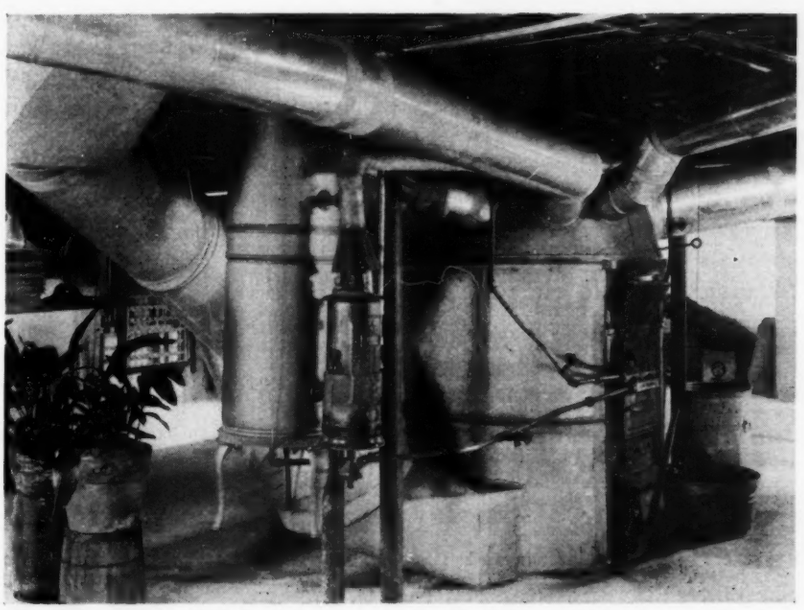
Mr. Girard wanted a similar heating installation in a semi-bungalow house having five rooms on the ground floor and three on the second floor. This was a house in which he was going to live himself and he said he wanted to know just what could be done with a warm air heating plant when a great many building contractors in Rhode Island consider nothing but steam, believing that it is easier to sell a steam heated house than a warm air heated one.

Mr. Heeks studied the proposition and selected another Torrid Zone furnace of the same size as the one in his home.

A warm air register was placed in each room. Each of the two bedrooms on the second floor are supplied with warm air by a 10-inch pipe. An 8-inch pipe supplies the bathroom. The kitchen gets its heat from a 9-inch pipe, the dining room from a 10-inch pipe and the living room from a 12-inch pipe. These pipe sizes were carefully calculated.

It was decided that it would not be necessary to use a return air from each room. A 16-inch return was located in the rear hallway and a 20-inch return in the living room. These returns are on opposite sides

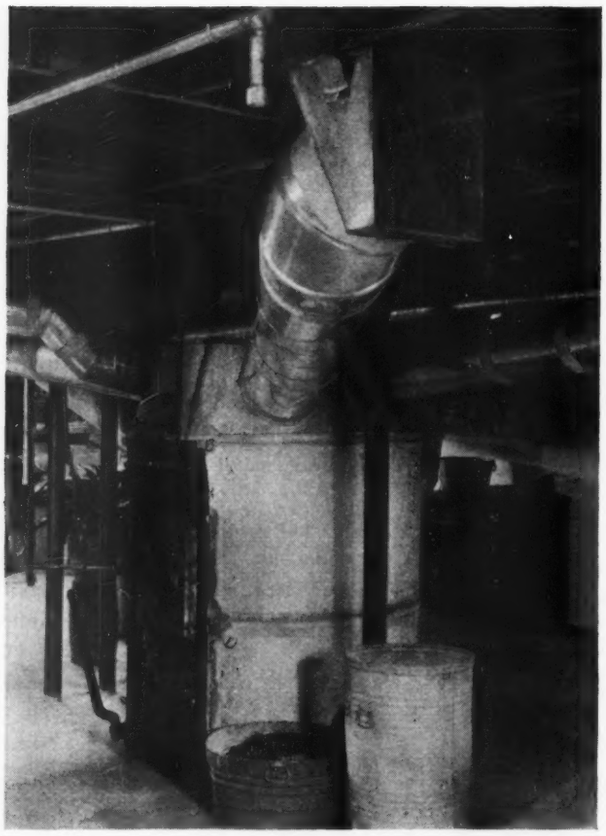
Above—This is the home built by Mr. Girard. So impressed was he by Mr. Heeks' system that he ordered one like it for this house.



Left—And this is the heating plant Mr. Heeks designed and installed in the Girard house. It is some larger and more spread out.

of the house and are close to both the front door and the back door. They are combined into one boot entering the furnace with all sharp bends eliminated.

When A. J. Magoon & Son make an installation they guarantee satisfactory service. They can do this because they take so much care in planning the installation and know exactly what it will do. However,



Another view of the Girard plant. A type of transition boot not commonly used appears in the foreground. Use of this was possible because of the height of the basement. The installation is gravity using coal. Note that all leaders are bright tin, uncovered.

it is not likely that in this installation they would have promised such low fuel consumption as was actually the case. Mr. Girard reports that he kept his house warm throughout the heating season of 1929-30 with only five tons of hard coal. The average fuel consumption for heating houses in this locality run at about a ton per room.

After using this heating plant for an entire heating season, watching the results with a critical frame of mind, Mr. Girard placed an order for another installation to be exactly the same and to be installed in another house he was building. This move on his part was the best of evidence that he was thoroughly sold on warm air heating.

Mr. Heeks lays no claim to being a super-salesman, but he is selling more and more warm air installations every year, because he insists that it is necessary to give a great deal of attention to every installation to make sure that it is exactly right.

Mr. Heeks has found that a common mistake is to use leaders that are too small. This mistake added to long runs in the basement makes it impossible to heat the house.

Another of his rules is that if there is any doubt regarding a size being large enough, it is better to use the next size larger. Never under any circumstances use pipe that is too small.

He has found that a reduction in pipe sizes with the same furnace will make a marked difference in the fuel consumption, while an increase in the pipe sizes will decrease the fuel bill. Of course it is also necessary to use a furnace that is large enough. It is installations like these which show up best in regard to cost of operation and satisfactory heating that do more to sell warm air heating, Mr. Heeks finds, than anything else possibly can.

The installation in his own house was put in while the house was being built and was used to heat it while the plastering was being done and the interior finish completed. This gave it a rather severe test at the start but it stood up under it and gave all the heat required to dry the moisture out of the plaster and to dry the paint, wall paper paste and the like.

Home Display

Another point that Mr. Heeks brings up is that every warm air heating contractor should have in his own home just as efficient a warm air system as he can install. It is not so necessary that the house be thoroughly insulated, or that it be built with a view to saving fuel. Doing this may defeat the purpose for the reason that people will say, they could not get as good results in their homes. It is better that the house be built just like other houses in the community, so that people will say that it is like their houses.

With a house like this, says Mr. Heeks, the contractor should install a very efficient heating system, show it to friends and prospective customers, keep an accurate record of the fuel used and all other costs. The contractor's plant will sell more jobs. People have more confidence when the man who is selling a thing uses it himself than they do when he is using something else.

More and more contractors are using their home installation for demonstration and experimental purposes. The value of this idea lies in the fact that such a home plant can be seen at any hour of the day or night, put through its paces to demonstrate and used for as long a period as necessary. Tell us about your system.

ESTIMATING VS. GUESSTIMATING

(Part III)

***By* S. T. MAYTER**

THE ambitious estimator, having submitted his bid to the architect, is patiently waiting his verdict. It might be well at this point to return to the beginning of the take-off, and dwell on some features of this part of the task of figuring the job.

The take-off *is the essential part of any bid.* The rest of the work can be performed by a stenographer, or an office boy, but the take-off requires experience, knowledge of the business, and judgment. Any good estimator always treats the take-off with respect, never hurries it, never takes anything for granted, and never performs it in a sketchy or incomplete manner.

After you get out of the fan room and start down a line of duct work, it is well to have some methodical plan in mind for checking the items as you enter them. Your yellow pencil marks (don't use a red one, it fades) should always be checked on the blue print in the same place, on ells, branches, tapers, risers and drops and straight runs. There are two reasons for this methodical practice. The first one is that it will prevent omissions or duplications of listing due to idle markings or carelessness.

The second is even more important. It enables you to identify the plans you figured after you have returned them to the architect.

Sometimes an obsolete set of prints, or a set missing a sheet or two of late revisions, in spite of the greatest care on the part of the architect, gets into the hand of one or two contractors. Then when their bid states: "We propose to furnish and install....., all to be in accordance with plans and specifications prepared by..... .....Architects."

What usually happens to contractors in this situation is just too bad.

Some architects require the successful bidder to sign each sheet of the plans, in addition to signing the contract. If you are able to identify the plans you figured, checking them with the architect, and receiving his assurance that they are complete, you may feel confident that you will not be required to donate a considerable portion of the work.

Don't Forget

Your take-off should cover each system separately, listing each complete unit from the intake louver to the last grille on the last run of duct. This practice will enable you to take care of subsequent changes that may enlarge or reduce a system, with a minimum of effort.

In taking off elbows, they may be treated as straight duct, except that they are measured from "back to back"—that is you measure to the farthest line and lift your rule and continue from the other farthest line as far as the same dimension continues.

Tapers should be figured the full size of the greatest dimension for their full length.

Perhaps the best method for figuring branches is to group them according to the limiting dimensions shown on the Ventilation Estimate form in the previous article. Then each group may be priced according to shop cost.

With all ducts listed according to size and length, the next operation is to determine the total square feet of each gauge in the job. We are submitting a simple table that any estimator can make for himself, that will save him countless calculations

(*Continued on page 23*)

Location ..... Name ..... Date .....

Architect ..... Engineer ..... Owner .....

	Square Feet	C	Weight *
No. 26 G. I. Ducts		1	
No. 24 G. I. Ducts		1.2	
No. 22 G. I. Ducts		1.5	
No. 20 G. I. Ducts		1.7	
No. 18 G. I. Ducts		2.2	
No. 16 G. I. Ducts		2.7	
No. 14 G. I. Ducts		3.6	
No. 12 G. I. Ducts		5	
No. 10 G. I. Ducts		6.3	
No. 16 B. I. Ducts		2.5	
No. 14 B. I. Ducts		3.3	
No. 12 B. I. Ducts		4.7	
No. 10 B. I. Ducts		5.7	
G. I. Angles 1"		1	
DUCT SLEEVES			
WEIGHT			

12	BELTS	23	SCREENS		DISCHARGE HOODS
13	DRIVES	24	VENTILATORS		MIXING DAMPER
14	BELT GUARDS	25	MUSHROOMS		
15	TEMPERATURE CONTROL	27	STATIONARY LOUVRES		
16	BY PASS DAMPERS	28	HOOD BASES		
17	MANUAL LOUV. DMPS.	29	FLOOR DEADENER		
18	THERMOMETERS	42	WIRING		
19	REGISTERS	43	PLUMBING		FANS TOTAL C.F.M.

44	FILTER PIPING	UNITS	TOTAL C.F.M.
45	CONCRETE		CU. FT.
47	PAINT 1 COAT		SQ. FT.
48	PAINT 2 COAT		SQ. FT.
49	PAINT 3 COAT		SQ. FT.
50	PAINT APPARATUS		
51	MAGNESIA COVERING		SQ. FT.
52	AIR CELL COVERING		SQ. FT.
			SQ. FT.
58	VENTILATION PERMIT		C.F.M.
88	RANGE HOOD		
89	FIRE DAMPER		
96	DAMPERS		
97	DIFFUSERS		
98	RADIATOR SHIELDS		
99	RECESS LININGS		
100	COPPER WORK		
101	BREECHING		
102	ACCESS DOORS		
104	LEAD WORK		

On this sheet square footages by gages are changed to weight by multiplying by the factor given under the column C. Other items cover equipment.

BASIC PRINCIPLES OF HEATING

By G. A. Voorhees

HEAT LOSSES FOR CONCRETE BLOCK

PROBABLY no type of building construction has brought so much grief to the heating contractor as the common concrete block. This applies, of course, to direct radiation systems as well as plants that heat by air circulation. In fact, a warm air furnace with a fan or blower for forcing the circulation beyond the normal capacity seems to come nearer to a solution of the problem than any other type of plant because of its great flexibility. Nevertheless, in almost any community, one can find several cement block buildings where heating plants of all types have been flat failures.

This is partly because no heat transmission coefficients for such building construction have been available until recent years. Consequently, the heating contractor usually had to make a wild guess as to the quantity of heat that the plant would be called upon to supply. The few who did try to calculate the heat losses through such walls fared little, if any, better because of inadequate data as to the conductivity of concrete as it appears in building block form. The nearest approach has usually been to assume that the rate of heat flow would be about the same per inch of thickness whether the concrete was in a poured wall or in the shape of building blocks.

Block Are Porous

The most casual observation, however, indicates that the average concrete building block is much more porous in structure than poured concrete walls. Consequently it absorbs more water. In buildings where the block wall is plastered on the inside, the plaster being applied directly to the concrete without furring out and lathing, it is not at all uncommon in rainy weather to find the plaster thoroughly water soaked over nearly the entire wall surface.

This increases in two ways the heat load that the plant must carry. First, the gradual evaporation of this water absorbs a great deal of heat from the room air. The writer has a particularly unpleasant memory of one job some years ago where the inner surface of the wall of a store building was frequently covered with a film of ice on cold mornings following periods of rainy weather. It was an 8-inch concrete block wall of average construction with plaster applied directly to the blocks on the inner surface. Until the ice was melted and the wall at least partly dried, it was decidedly uncomfortable for occupants of the building to remain for any length of time in the vicinity of the wall, *even when the average room air temperature was raised somewhat above 70 degrees.* This was because the cold wall was absorbing so much radiant heat from the body; it had the *effect* of increasing the radiant heat loss from the body.

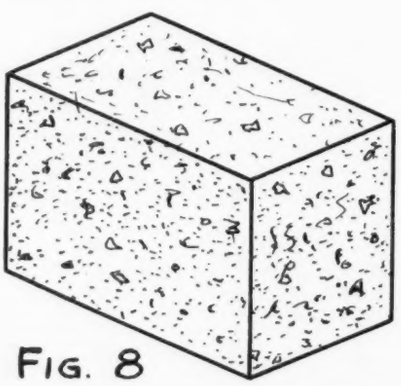


FIG. 8

A 6-inch poured concrete wall without exterior or interior finishes has a heat transmission coefficient of 0.58. How finishes reduce this loss is shown in the table

In any such case, and the instance just cited is not at all unusual, the heating plant not only has to supply the extra quantity of heat required to dry out the wet wall, but the heat *transmission* of the wall is also increased because wet concrete conducts heat more rapidly than dry concrete.

If we have designed our plant on the basis of a dry concrete block wall, the absorption of water by the structural material has already added two "unexpected" loads to the heating plant. And there are more to come.

Mortar Joints

The mortar bonds in a concrete block wall leave much to be desired. The horizontal joints may be reasonably tight, but equally good vertical joints are hard to find. Cracks and holes in the mortar bonds between blocks at the outer surface permit water to enter directly into the wall structure, and on the windward side of the building a considerable amount of rain beats in through these crevices. This, added

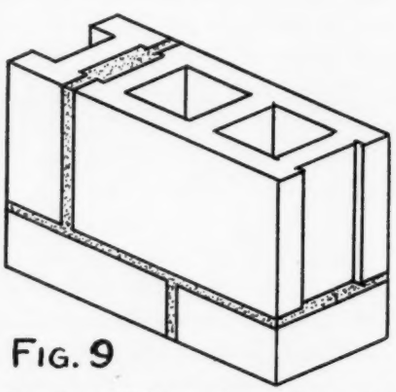


FIG. 9

Despite publicity to the contrary, the heat loss through a concrete block is higher than through a monolithic wall. The coefficient for this 8-inch block is 0.60

to the water that so readily soaks into the porous outer surface of the blocks at least keeps the wall quite damp, if not partly water soaked, throughout the heating season.

But these faulty mortar joints are the direct cause of another large heat loss because they permit an unexpected amount of cold air to blow in on the windward side and an equal volume of heated room air to leak out on the leeward side of the building—unless the wall is plastered.

Examine from the inside any unplastered cement block wall of average construction and notice in how many places daylight can be seen through holes in the mortar. Then consider that it's only when the hole in the mortar bond at the inside of the wall happens to "line up" with a hole in the outside bond that daylight can be seen. There are many more which are not so readily noticed because they don't happen to coincide in pairs with the line of sight—but we find ample evidence

FIG. 10

Concrete slab roofs with insulation and roofing material pass heat easily. The coefficient for this combination is 0.66

of them as we pass our hand along the mortared joints on a windy day and feel the cold air rushing in.

The increase in heat transmission loss due to the damp or wet condition of such a wall should be included in the heat transmission coefficient. Unfortunately, no reliable data is available at present to definitely indicate the increased heat loss due to moisture in the wall and the coefficients quoted are based on tests of dry blocks.

High Heat Loss

The magnitude of the heat loss due to air leakage through the wall itself is also uncertain. Results of some tests on 8-inch brick walls have shown that with a 15-mile wind the leakage of air through the wall amounts to almost 8 cubic feet per hour for each square foot of surface. It was stated in the report that this excessive infiltration was

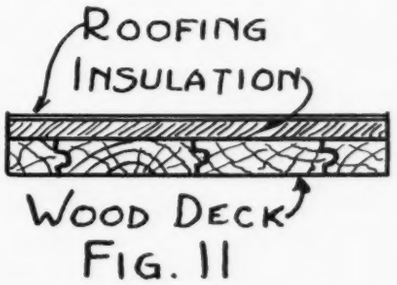


FIG. 11

Wood decks with insulation and paper are better insulators as shown by this combination with a coefficient of 0.49

"probably representative of poor workmanship with porous brick and lime mortar," and that walls of hard brick, well laid up with cement mortar, showed a leakage of only about 2.6 cubic feet of air per hour per square foot of wall surface with a 15-mile wind. A coat of plaster applied to the inside of the wall reduced the infiltration about 96%, so it is safe to assume that with a plastered wall (either of brick or cement block) air leakage through the wall is negligible.

With a plastered wall, the only increased allowance is for moisture.

Several years ago the writer adopted for use in his own work a transmission coefficient of 0.57 for an 8-inch concrete block wall not plastered, and has since raised this to 0.60, which seems high in comparison with the coefficient of 0.458 given in the 1932 edition of the Heating Engineers Guide. This should not be taken as a criticism of the Guide coefficient, which is necessarily based on dry concrete blocks because authoritative data on the effect of moisture is not yet available.

Furthermore, the Guide does not include infiltration as a part of the heat loss to be covered by the transmission coefficient. And, strictly speaking, it probably should be figured as a part of the general infiltration heat loss of the building.

In any event, the results with the 0.60 coefficient have been highly satisfactory. The writer would like to hear from any readers who have tried out other methods of figuring or estimating heat losses through cement block walls.

A. S. H. & V. E. Coefficients

For 8-inch blocks made of cinder concrete the A. S. H. & V. E. Guide gives a transmission coefficient of 0.311, which is about 36% less than that given for standard concrete blocks of 1-2-4 mix. Although the coefficient for cinder blocks is based on dry cinder concrete, it is probably not far from the correct coefficient for blocks as actually used in construction, because cinder blocks seem to absorb much less water than the ordinary cement blocks.

The heat loss factors for both cinder and stone concrete blocks in the accompanying table are based on coefficients which the writer personally prefers, and the relation between these coefficients and those listed by the A. S. V. H. E. are given here for the reader's information and comparison. [**Table 1**]:

[TABLE 1]

	Coefficient Given by A. S. H. V. E.	Coefficient Used in Table	Increase
8″ Concrete block, plain, no interior finish	0.46	0.60	30%
Same with ½″ plaster on concrete	0.42	0.48	14%
With lath and plaster furred	0.29	0.32	10%
With ½″ plaster on ½″ fibre board plaster base, furred	0.21	0.23	10%
12″ Concrete block, plain	0.34	0.42	24%
Same with ½″ plaster on concrete	0.32	0.36	13%
8″ Cinder block, plain	0.31	0.36	16%
Same with ½″ plaster on block	0.29	0.32	10%
12″ Cinder block, plain	0.22	0.25	14%
Same with ½″ plaster on block	0.21	0.23	10%

HEAT LOSS FACTORS OF BUILDING CONSTRUCTION—(Continued)

Sec.	TYPE OF CONSTRUCTION	HEAT LOSS FACTOR for difference between inside and outside temperature of 50 deg.	60 deg.	70 deg.	80 deg.	Heat Transmission Coefficient
K	6-IN. CONCRETE, POURED (Figure 8):					
	Plain, no interior finish	29.0	34.8	40.6	46.4	0.58
	With ½-in. plaster on concrete	26.0	31.2	36.4	41.6	0.52
	With lath and plaster, furred	16.5	19.8	23.1	26.4	0.33
	With ½-in. plaster on ½-in. fibre board, furred	11.5	13.8	16.1	18.4	0.23
	8-IN. CONCRETE, POURED:					
	Plain, no interior finish	25.5	30.6	35.7	40.8	0.51
	With ½-in. plaster on concrete	23.0	27.6	32.2	36.8	0.46
	With lath and plaster, furred	15.5	18.6	21.7	24.8	0.31
	With ½-in. plaster on ½-in. fibre board, furred	11.0	13.2	15.4	17.6	0.22
	10-IN. CONCRETE, POURED:					
	Plain, no interior finish	23.0	27.6	32.2	26.8	0.46
	With ½-in. plaster on concrete	21.0	25.2	29.4	33.6	0.42
	With lath and plaster, furred	14.5	17.4	20.3	23.2	0.29
	With ½-in. plaster on ½-in. fibre board, furred	10.5	12.6	14.7	16.8	0.21
	12-IN. CONCRETE, POURED:					
	Plain, no interior finish	20.5	24.6	28.7	32.8	0.41
	With ½-in. plaster on concrete	19.0	22.8	26.6	30.4	0.38
	With lath and plaster, furred	13.5	16.2	18.9	21.6	0.27
	With ½-in. plaster on ½-in. fibre board, furred	10.0	12.0	14.0	16.0	0.20
L	8-IN. CONCRETE BLOCK (Figure 9):					
	Plain, no interior finish	30.0	36.0	42.0	48.0	0.60
	With ½-in. plaster on block	24.0	28.8	33.6	38.4	0.48
	With lath and plaster, furred	16.0	19.2	22.4	24.6	0.32
	With ½-in. plaster on ½-in. fibre board, furred	11.5	13.8	16.1	18.4	0.23
	12-IN. CONCRETE BLOCK:					
	Plain, no interior finish	21.0	25.2	29.4	33.6	0.42
	With ½-in. plaster on block	18.0	21.6	25.2	28.8	0.36
	With lath and plaster, furred	13.0	15.6	18.2	20.8	0.26
	With ½-in. plaster on ½-in. fibre board, furred	9.5	11.4	13.3	15.2	0.19
M	8-IN. CINDER BLOCK (Figure 9):					
	Plain, no interior finish	18.0	21.6	25.2	28.8	0.36
	With ½-in. plaster on block	16.0	19.2	22.4	25.6	0.32
	With lath and plaster, furred	11.5	13.8	16.1	18.4	0.23
	With ½-in. plaster on ½-in. fibre board, furred	9.0	10.8	12.6	14.4	0.18
	12-IN. CINDER BLOCK:					
	Plain, no interior finish	12.5	15.0	17.5	20.0	0.25
	With ½-in. plaster on block	11.5	13.8	16.1	18.4	0.23
	With lath and plaster, furred	9.0	10.8	12.6	14.4	0.18
	With ½-in. plaster on ½-in. fibre board, furred	7.0	8.4	9.8	11.2	0.14

Sec.	TYPE OF CONSTRUCTION FLAT ROOFS covered with BUILT-UP ROOFING NO CEILING—under side of roof exposed	HEAT LOSS FACTOR for difference between inside and outside temperature of 50 deg.	60 deg.	70 deg.	80 deg.	Heat Transmission Coefficient
N	2-IN. CONCRETE DECK (Figure 10):					
	Roofing on concrete, no insulation	33.0	39.6	46.2	52.8	0.66
	Same with ½-in. fibre board insulation between roofing and concrete	16.5	19.8	21.3	26.4	0.33
	With 1-in. fibre board insulation between roofing and concrete	11.0	13.2	15.4	17.6	0.22
	With 1-in. corkboard between roofing and concrete	10.5	12.6	14.7	16.8	0.21

Sec.	TYPE OF CONSTRUCTION FLAT ROOFS covered with BUILT-UP ROOFING NO CEILING—under side of roof exposed	HEAT LOSS FACTOR for difference between inside and outside temperature of 50 deg.	60 deg.	70 deg.	80 deg.	Heat Transmission Coefficient
	4-IN. CONCRETE DECK:					
	Roofing on concrete, no insulation	28.5	34.2	39.9	45.6	0.57
	Same with ½-in. fibre board insulation between roofing and concrete	15.5	18.6	21.7	24.8	0.31
	With 1-in. fibre board insulation between roofing and concrete	10.5	12.6	14.7	16.8	0.21
	1-IN. WOOD DECK (Figure 11):					
	Roofing on wood, no insulation	24.5	29.4	34.3	39.2	0.49
	Same with ½-in. fibre board insulation between roofing and wood	14.0	16.8	19.6	22.4	0.28
	With 1-in. fibre board between roofing and wood	10.0	12.0	14.0	16.0	0.20
	2-IN. WOOD DECK:					
	Roofing on wood, no insulation	17.5	21.0	24.5	28.0	0.35
	Same with ½-in. fibre board insulation between roofing and wood	11.5	13.8	16.1	18.4	0.23
	With 1-in. fibre board between roofing and wood	8.5	10.2	11.9	13.6	0.17
	METAL DECK					
	Roofing on metal, no insulation	39.0	46.8	54.6	62.4	0.78
	Same with ½-in. fibre board insulation between roofing and metal	18.0	21.6	25.2	28.8	0.36
	With 1-in. fibre board between roofing and metal	11.5	13.8	16.1	18.4	0.23
	CORRUGATED IRON ROOFS: (No built up roofing)					
	Metal on roof joists, no ceiling	75.0	90.0	105.0	120.0	1.50
	Metal on 1-in. wood deck, no ceiling	32.5	39.0	45.5	52.0	0.65

Estimating vs. Guesstimating

(*Continued from page* 19)

in reducing the perimeter of ducts in inches to the equivalent decimal for square feet. With this chart before him, the estimator has only to multiply the length by the decimal to secure the total square feet in each horizontal column on the take-off sheet. This chart is as follows:

	6″	7″	8″	9″	10″	11″
1 Ft.	.2	.3	.5	.7	.8	
	12″	13″	14″	15″	16″	17″
2 Ft.	.2	.3	.5	.7	.8	
	18″	19″	20″	21″	22″	23″
3 Ft.	.2	.3	.5	.7	.8	

Continue this chart as high as you like, although 120 inches is a good place to stop. The last line of your chart will then be as follows:

	120″	121″	122″	123″	124″	125″
20 Ft.	.2	.3	.5	.7	.8	

To use this chart simply add, mentally, the width and depth dimension of any duct, find the corresponding figure in the inch column and the square feet per linear foot for a duct that size will be feet and decimal immediately below this figure, thus a 6-inch by 6-inch duct equals 12 inches in the top column, and 2 feet below, which is the square feet per linear foot for a duct the two dimensions of which equal 12 inches. Also an 8-inch by 8-inch or a 10-inch by 6-inch duct both equal 16 inches under which we find .7 which is added to the even feet at the left, which figure is used for all dimensions in this column, only the decimal changing as shown. In this case the figure 2.7 square feet per linear foot is the figure we use.

If the estimator uses a slide rule, a further saving in time can be made particularly when a setting of square feet per linear foot is once made, all similar entries on the take-off sheet can be listed in the respective gauge columns at the right of the sheet, merely by reading the totals from the slide rule.

The proper allowance to be made for lap, waste, seams, and hangers is another disputed point in many shops. Most estimators prefer to use a constant for the weight per square foot of metal that will include this allowance, similar to the following:

26 Ga. Galv.....1.0 lb. per sq. ft.
24 Ga. Galv.....1.2 lb. per sq. ft.
22 Ga. Galv.....1.5 lb. per sq. ft.
20 Ga. Galv.....1.7 lb. per sq. ft.
18 Ga. Galv.....2.2 lb. per sq. ft.
16 Ga. Galv.....2.7 lb. per sq. ft.
14 Ga. Galv.....3.6 lb. per sq. ft.
12 Ga. Galv.....5.0 lb. per sq. ft.
10 Ga. Galv.....6.3 lb. per sq. ft.
16 Ga. Blk. Iron..2.5 lb. per sq. ft.
14 Ga. Blk. Iron..3.3 lb. per sq. ft.
12 Ga. Blk. Iron..4.7 lb. per sq. ft.
10 Ga. Blk. Iron..5.7 lb. per sq. ft.
1″x1″x⅛″ Galv. Angles.....1.0 lb. per lin. ft.

METAL FINISHING IN SIGN CONSTRUCTION

A Description of the Special Processes Used by Electrical Products Corp., Denver, to Prevent Peeling and Speed Up Painting Operations

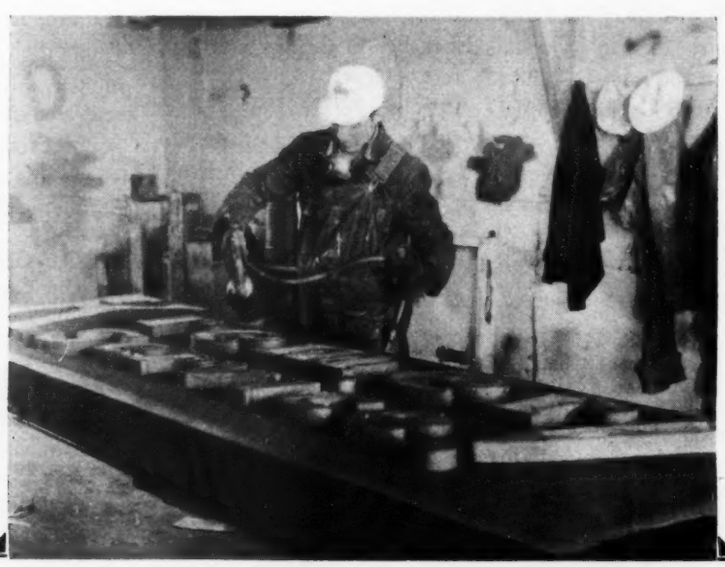
SHEET METAL has long been the standard background for outdoor signs, yet the advent of the Neon tube sign, and the rapid growth of this new industry, has brought considerable experimenting on the part of sign manufacturers looking toward solution of certain problems in metal finishing.

One of these problems is the breaking up of reflections on large metal surfaces. For some time this has been managed, in the shop of the Electrical Products Corporation of Colorado, at Denver, by the use of crimped metal in the sign surfaces, especially the larger ones. The small signs are not so subject to reflections, so many of them are made of plain galvanized sheet, as are all parts of the large signs except the face.

Another trouble this sign manufacturer faced in finishing his product was peeling. With the utmost care in cleaning and preparation of the metal it was difficult to make the finishing materials stick properly. High test gasoline and benzine were usually considered the best for cleaning the metal surface, and served the purpose very well. However, speed is a very desirable factor in finishing signs, and in searching for the best and fastest means of preparation the company's foreman finisher finally developed a preparation which has not only eliminated peeling, but takes the place of cleaning fluids, forming a perfect base for finishing materials when brushed on, regardless of grease, oil, paint, tar, etc., on the metal surface.

After this material has been applied and allowed to dry for 10 to 15 minutes the surface is wiped off with a soft cloth. After drying from 2 to 5 hours longer (according to the temperature), the metal is given a coat of 50 per cent metal primer and 50 per cent metal surfacer, giving it one heavy or two light shots. This dries from 15 minutes to one hour, depending on temperature. The surface is then sanded with a few strokes of emery or garnet paper.

Colors marked on the pattern are then checked. In spraying the white is always applied first. Also any raised block letters with light colors. Flat painted letters which happen to be light, non-bleeding colors, are then sprayed on and dry in from 30 minutes to two hours. While waiting for these to dry, fancy borders or scroll work included in the pattern is traced upon wrapping paper and cut out with a razor blade. The paper is then cemented down with a special rubber cement prepared in the shop. By preparing this cement it may be made fast or slow drying, according to needs,



Block letters are sprayed with white first. Then the sides are sprayed and taped and the final coat applied

and is more economical. Large designs which take more time to apply call for slower drying cement.

The designs and letters are pressed down firmly on the metal, to prevent uneven edges or fogging. Surplus cement is then wiped off with a ball of rubber held in the hand. Outlines and borders are then sprayed on at the same time and allowed to dry thoroughly, usually requiring less than an hour.

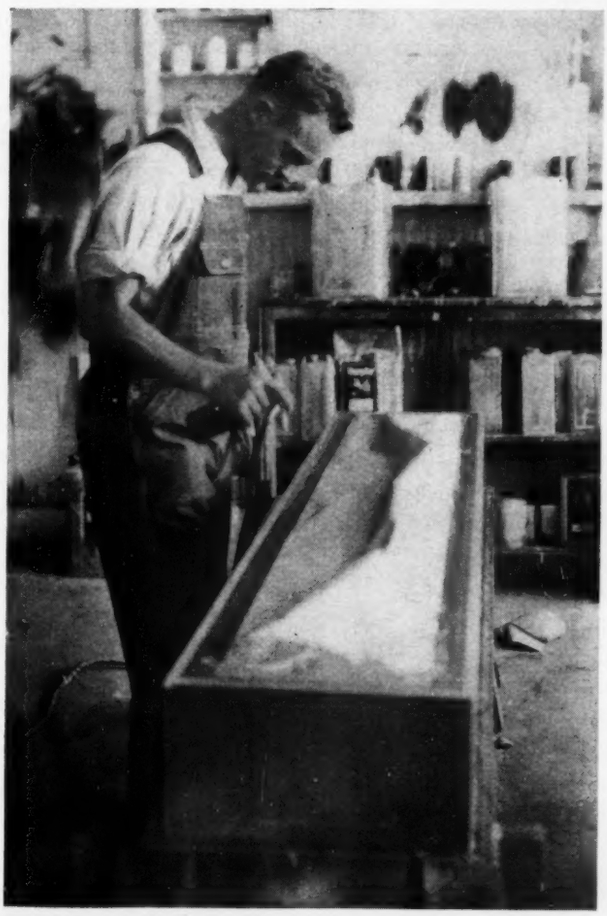
The border is then masked with gum tape, which may be had in any required width. It is also used around the edges of flat painted letters already sprayed on. Large or complicated designs, however, are masked with paper and cement, sticking down on paint lines only. Where the design is too complicated to manage after cutting it out, it is applied to the sign and then cut, leaving the necessary portions.

Any raised portions on the sides of block letters are then sprayed and when dry the sides are covered with tape, of whatever width corresponds with the height of the letters. Outlines on the background around the raised letters are masked in the same manner. Any raised moldings are always sprayed last, masking a strip along each side. Flat painted letters that are shaded rather than outlined, are cut out as one letter and the lightest color sprayed on first. The letter and the shaded part are cemented down together. It is then cut on lines that separate the shaded part from the letter and the part covering the darkest color is removed. This color is then applied and is remasked.

The rest of the sign is sanded and brushed off clean, then the background is applied in two or

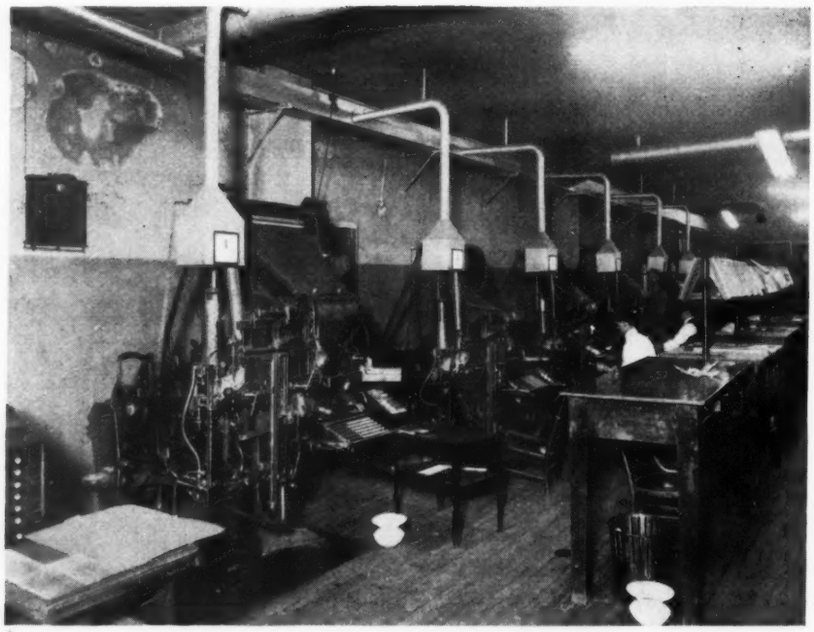
(*Continued on page* 28)

Spraying shaded letters requires skill. This operator is spraying shaded lettering. Each letter is cut individually in paper and the lightest color applied first



The borders are sprayed last. The entire center is masked with paper and tape so that no paint will reach the center. A fine, thin spray is used

The cleaning preparation used forms a perfect painting base. This operator is rubbing the preparation off preparatory to applying the primer and resurfacer coat



Commercial areas below sidewalk levels must be ventilated if conditions are to be conducive for work. The only practical way of getting clean air into and vitiated air out of such areas is by mechanical ventilation. This article sets forth some basic principles applying to the sale and design of such systems.

VENTILATION For Below Sidewalk Spaces

THE absence of full-sized windows in below-ground rooms makes owners and tenants of such places exceptionally good prospects for the sale of mechanical ventilation and air conditioning by sheet metal contractors. Although results are not always satisfactory when fresh air is secured via the open window, this homely method can be pressed into service in many classes of above-ground places. Not so, the underground room.

Anyone familiar with basements knows that light (meaning, here, windows) is poor. And in the same ratio that light is poor, so also is ventilation, unless effected by other than mechanical fans.

In some cases exhausting the vitiated air from basements is sufficient. This is particularly true when there are one or more suitable openings at opposite ends of such rooms for the natural entrance of fresh air to replace the air exhausted. When fans are used for the purpose, it makes little difference whether they are propeller or cased type, unless ducts must be run to the roof. Then cased fans are necessary to overcome friction loss within ducts.

To insure jobs that are above criticism, however, engineers usually recommend supply fans and dust filters as well as exhaust fans. Filters are valuable in city installations because the incoming air generally is taken from street level.

A feature which makes below-street level ventilating installation attractive from a profit standpoint is the fact that these spaces should have two systems—one for supply and the other exhaust. A typical system is shown as, for example, a restaurant, and is indicated in Fig. 1.

Estimating Capacities

If contractors estimate the fresh air supply as equivalent to a theoretical 10-minute air change of the entire room, this will be found a safe figure. Due to the heavy peak occupancy load the computed air change cannot well be less than every 10 minutes. And, due to requirements of the system during the winter (unless the air supply must supply heat), a more rapid change will bring draft complaints. To estimate the air requirement in cubic feet per minute, divide the cubic contents by 10.

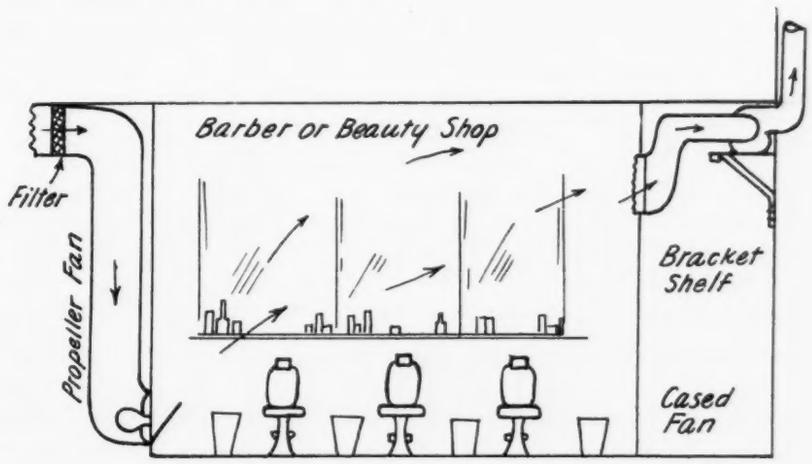
Kitchen air should be changed every three minutes or so, and range hood mouth velocities customarily are taken as 250 linear feet per minute. With such an arrangement the vitiated air from the restaurant outlined in Fig. 1 passes to the kitchen and to the atmosphere through the range hood.

Some boards of health raise no objection to discharging cooking odors directly into the street. Others insist that they be discharged at the roof. In the latter case ducts must be included for the discharge end of the fan as well as the inlet side.

Air delivery openings of the fresh air supply duct in Fig. 1 are better located on the side than on the bottom. Spacing 20 feet apart is customary unless the room is small, when one-half the distance

between outlet diffusers is better. It is suggested, further, that the entrance velocity be not greater than 350 linear feet per minute to prevent draft complaints.

Summer setting of 350 feet is welcomed by patrons, while 250 feet rate of flow is better for winter. It is at once apparent that when air openings are on the side of the fresh air duct, the incoming air has a good chance of reaching all parts of the room. Were they on the bottom, the supply would short circuit to the kitchen.



1—Barber shops and beauty parlors frequently use below sidewalk areas. Air movement through such shops must be constant and clean, but not too brisk. The article describes the design of a typical system

Barber Shops

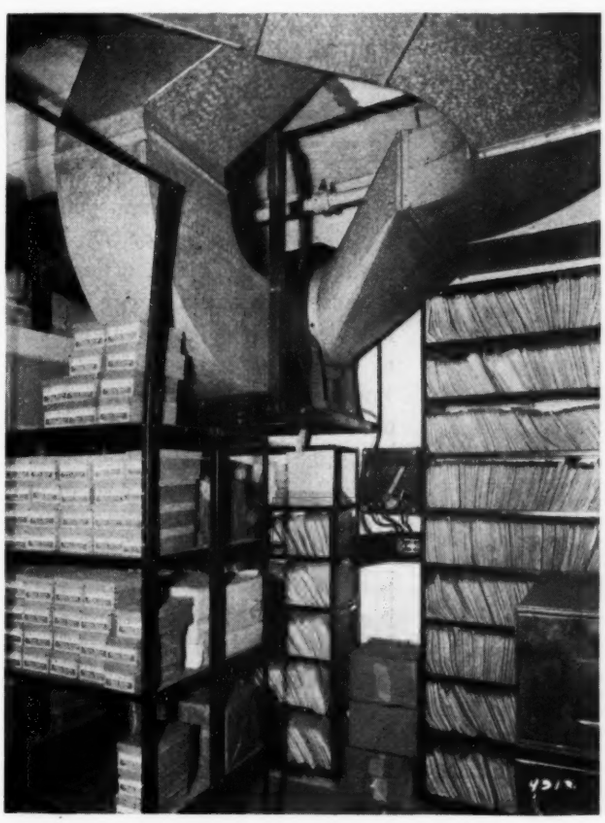
Another good ventilation market is barber shops and beauty parlors, which very frequently are found below the sidewalk. In summer such places become hot and, once the barber's coverlet is thrown over the patron, all pleasure vanishes. Here, also, is a good opportunity to sell a cooling system in addition to the ventilation.

There should be a constant and complete current of air through barber shops, particularly in summer. Observe how in Fig. 2 a filter has been placed in the entrance duct. The propeller fan was selected here because the supply duct is not longer than 30 feet and the entrance air velocity is low, not greater than 300 feet per minute. High air speed should be avoided, else the barber will probably find hair cutting difficult.

Attention also is directed to the door in front of the fan. This is so arranged on bottom hinges that it can be locked at night, but released at the top while the fan is in operation. It prevents the flow of air directly on persons in nearby chairs, yet does not prevent circulation through the shop.

Near the top of the opposite side of the shop there is a wall grille through which the used air is exhausted by a cased fan mounted on a bracket shelf in an adjacent hallway or other room. If the air of the shop is changed every 12 minutes, this should be plenty for good ventilation. Both supply and exhaust fans should handle about the same quantity of air. If suitable starting and regulating switches are provided, one or both fans can be run as desired. Maximum speed would be desirable only during morning opening hours and when the shop was full of customers.

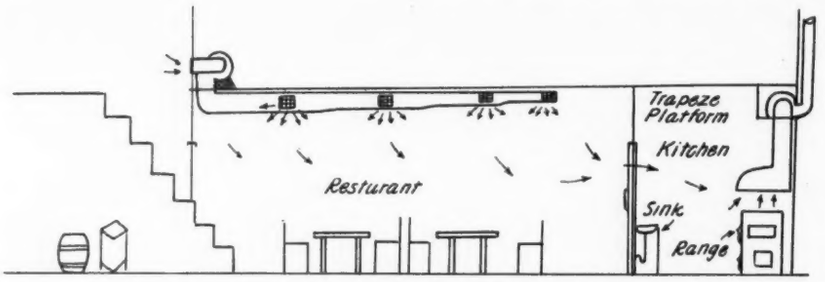
Filters daily are becoming more important in the ventilation work sheet metal contractors are asked to figure. In keeping street dust out, particularly in barber shops and beauty parlors, their value far exceeds their cost. Hence, they should be recommended as often as possible.



Vaults, record storage chambers and store rooms are three other types of below sidewalk rooms which require constant air change. For such rooms mechanical air change is the only feasible method. This particular installation is a bank record vault

Printing Shops

Printing establishments represent another good class of ventilating and air conditioning prospect for sheet metal contractors. In some states legal requirements make necessary the exhaust of noxious fumes from type melting kettles in view of the large lead content of the smoke that arises from them. This, coupled with carbon monoxide from



Restaurants have long used low level rooms. The problem is to keep kitchen air and odors from the rest of the restaurant and provide continuous and gentle air change throughout the rooms. Range hoods must have high velocities and rapid change

the gas burners, make such places injurious to health.

Anyone who has visited the average print shop knows what an annoyance the combined smells from linotype and stereotype kettles and ink are. When such places are below ground, as they often are, it is a civic duty for ventilation contractors to submit proposals to the owners without delay.

There should be an air change of the press room every 10 minutes or so. Some engineers hold this is too rapid because of the danger of air currents interfering with proper printing. But during the summer, at least, the 10-minute change is not too great.

Stereotype kettles usually require not less than a 4-inch branch pipe and hood over each, and a 6-inch exhaust pipe is better. Not less than 250 cubic feet per minute should be passed up through each hood.

The branch pipes from linotype machines would best not be smaller than 3 inches, and 4 inches is better practice. Some printing plants have 25 or more of these typesetting machines. A typical main and branch arrangement is shown in an accompanying illustration. It would have been better had the designer of this system joined branches to the main on an angle of 45 degrees in the direction of air flow.

As branches join the overhead trunk duct, the area of the latter must be increased so that it equals at all points the total areas of all branches between any point and the final branch. Then add from 10 to 20 per cent to the main area as a safety factor. Make the area of the fan inlet the same as the duct as it reaches the fan and discharge the foul air at the roof, if possible.

Air conditioning is daily becoming so closely connected to ventilation that in many places where ventilation is required owners can be persuaded to spend slightly more for controlled air. This implies humidification in winter and dehumidifying and temperature reduction in summer. One of the best ways to bring both results about is by adding an air washer to the system.

The previously mentioned underground rooms are but a few of the many. One might add as prospects, for instance, store rooms, "bargain basements," engine rooms, boiler rooms, bank vaults, speakeasies, laundries, repair shops of many kinds.

Metal Sign Finishing

(*Continued from page* 25)

"Cross-overs," the spaces between letters on the tubing, are painted the same color as the background. The first coat is black lacquer and the color coat is on the black. The black prevents light coming through the tube

three coats, each coat drying from 30 minutes to an hour before applying the next. All tape, masks and rubber are next removed and the sign is given one or two heavy coats of clear lacquer, which dries thoroughly before the sign goes to the electrical shop for application of electrodes, wiring and tubing. Portions of the tubing between letters, called cross-overs, are painted the same color as the background behind them. The first coat on the tubing, however, is always black lacquer, applied with a brush, to prevent light coming through and because oil will short the current through the tube.

Occasionally it becomes necessary to shoot a light color over a dark, bleeding, color. This is done by the use of two shots both of which are applied to the dark surface.

FAN BLAST ENGINEERING

by PLATTE OVERTON
ENGINEERING EDITOR

Inlets and Outlets

THE function of a warm air inlet is understood. Its location is often misunderstood. Two important items must be remembered. First, that inlets must be so located that the proper and even distribution of air is assured, and second, that cold, outside, exposed surfaces will be warmed.

The occupant of a room may sit in air at seventy degrees temperature and feel cold. This is sometimes termed "cold 70." We are shown in the study of physics that warm objects radiate heat toward colder objects. If the occupant of a room sits in close proximity to a cold wall, he will radiate heat toward the cold surface regardless of the temperature of the air in which he sits. This radiation of heat from the body will cause an uncomfortable and chilly feeling. Large glass areas without storm sash are prone to be such trouble makers if warm air inlets are located in the wrong areas. We have noted that the steam, hot water, and vapor heating contractors always locate their radiation against outside walls and below windows.

Fig. 14 is also a rough idea of the location of such inlets to prevent cold areas in rooms on the pressure side of the house. The protected side is not so important.

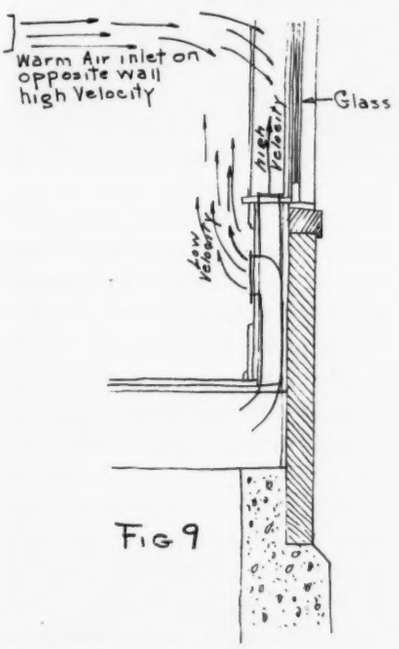


Fig 9

When inlets are placed under windows, low velocities should be used to keep a film of warm air moving up the glass. When side wall or window sill inlets are used, higher velocities should be employed to force warm air over the glass

Where large glass areas are encountered inlets should be so located that a film of warmed air can be forced over the exposed glass surface. Such inlets may be located in the window sills, directly across the room with high velocity grilles, or directly below the window with low velocity inlets. Low velocity inlets are necessary here to assure the warmed air flowing upward, as too high a velocity would tend to carry the air out into the room.

The writer has in some cases installed the inlets in the top sill of the window and the air was forced down over the glass surface.

Fig. 9 shows a typical window and the location of inlets in various positions.

One of the important items in good air conditioning is "a constant circulation of air throughout the room, or house." This movement of air should be rapid enough to remove smoke, odors, and maintain the balmy condition experienced outside on a June day with a soft wind blowing. Authorities disagree about the rate of air change per hour, but they all agree that circulation is important. This distribution and circulation of air must be free from drafts.

This man is sitting in a draft which strikes the back of his neck. Colds, so we understand, today, are caused by cooling a small area of the body more rapidly than other areas or faster than the body can warm the portion exposed to cold air

Fig 10

Fig. 10 gives a graphic description of drafts. This fellow sitting here is headed for a cold if the movement of air labeled "draft" is at variance with the balance of the

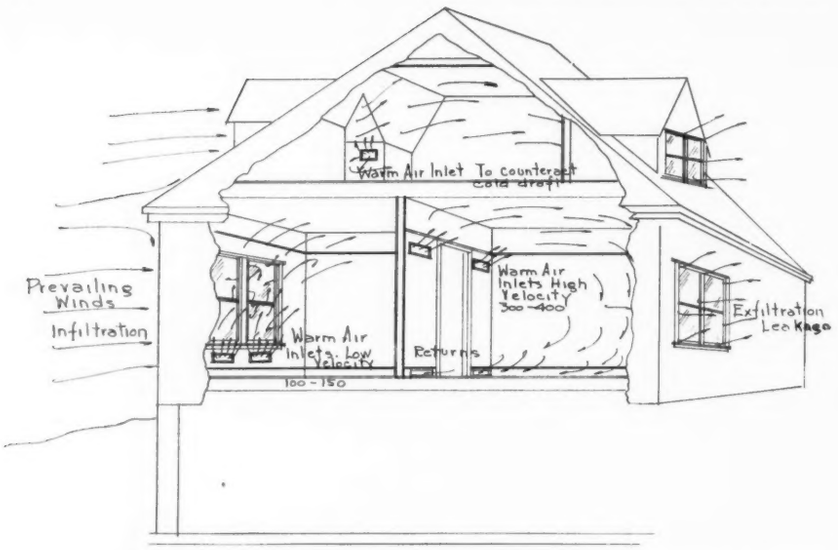


Figure 14. This cutaway view of a house shows how air movement is affected by exterior wind pressure. There is also shown outflow of air from the house. Two types of inlets are shown, below window and high side wall

air movement by any perceptible difference in temperature. There will be, of course, for that is one of the reasons we have drafts. Drafts may be caused by any number of conditions. Rapid heat loss in the room. Too rapid an air change or

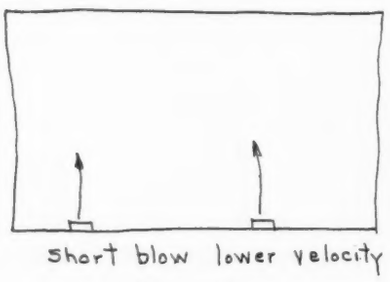


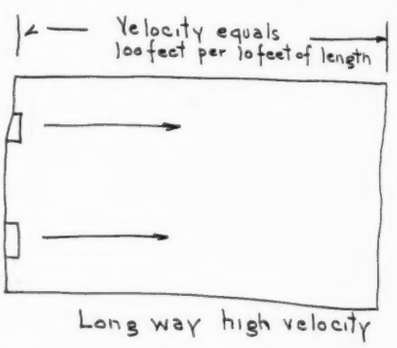
FIG 13

When rooms are narrow in front of inlets reduce the velocity. Govern the velocity by the width in front of the inlet

too slow. Too high an inlet temperature or too low. Location of warm air inlet or returns. "Off" and "on" or intermittent service of fan. The greatest sinner of all is the "open window."

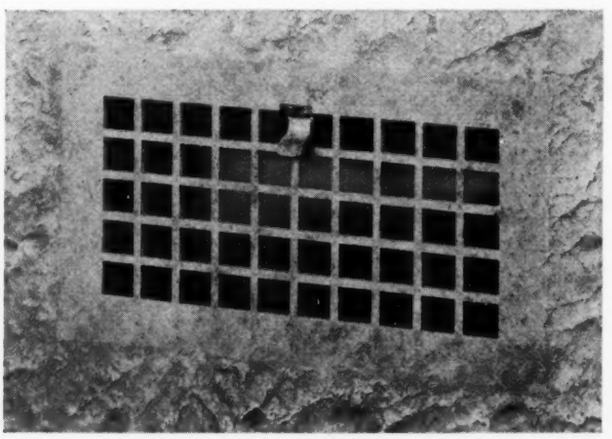
It is well at this point to call attention to the fact that "air changes per hour" is a misleading statement. A room may have a 10-minute air change so far as volume is concerned, while one-half or more of the room may be stagnant. This takes us back to warm air inlets and their location. It is well to remember that within practical limits, too many inlets and outlets are impossible. The more the better.

As pointed out in "The Ideal System" areas of high and low pressure are to be avoided. In most homes, doors are left open, and in many houses the living room, hall, dining room, and library have arched openings without doors. If



When rooms in front of inlets are long, use higher velocities. Use enough velocity to reach the opposite wall

In modern forced air systems, registers and return faces are now available which can be plastered into the wall. In this face plaster is applied directly over the frame



one room has a 10-minute air change and another a 20-minute change, a very noticeable movement of air from the 10-minute to the 20-minute room will be experienced. If the heat loss in the room with the 10-minute air change is high—as the rapid change would signify—there will be a "draft."

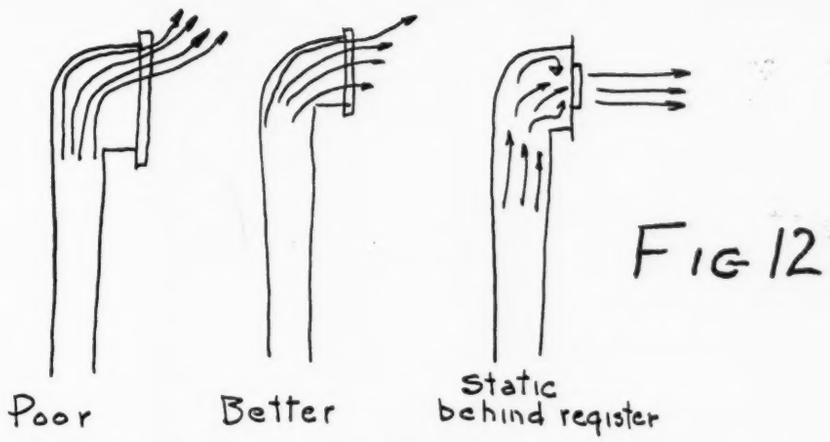
The solution is a balanced air change and as short a movement as possible from the inlet to the outlet.

We do not experience drafts in the open; the pressure remains constant and the temperature does not vary. When we open a window, a draft is the immediate result.

Too great a variation of inlet temperature at the warm air inlet will create drafts.

Stratification is the result of no air movement, or very little circulation. Well insulated houses are more liable to have stratification than exposed houses with a high heat loss. Cold walls tend to chill the air and it falls, keeping the air in this area in constant circulation. In well insulated houses the importance of a continual operation of the fan is obvious. Without the cooling effect of uninsulated surfaces or a forced circulation from the fan, the warm air will rise to the ceiling and stay there.

Kitchens, toilets, and garages are ventilation problems. In the average one or two-car garage ventilation may be left to leakage or exfiltration. Large garage doors are seldom tight and ventilators and



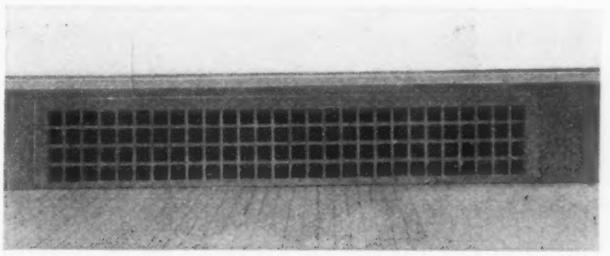
This group of three inlets shows what happens in three typical openings and throats. In designing the inlets you are after two things—directional control and even distribution over the face. The three inlets show what happens at the face

vent stack are unnecessary. Kitchens should have exhaust fans. Such fans are now on the market and work very well. They are manually controlled and are used only while cooking. Toilets and bathrooms may be vented to the attic and there connected direct to a roof vent or special flue. The exhaust grilles should have back draft dampers. Such vents should be sized to exhaust *more* air than is supplied. This tends to create an "in" draft when doors are opened and prevents odors from permeating the adjacent areas.

With the advent of mechanical systems in homes, the question of registers or warm air inlets was left to the owner. I believe the salesman or contractor should direct the prospect to the new and modern types now on the market. The smaller and more inconspicuous the register the better. Fig. 11 is a view of good practice with small grilles.

The width of the stack will fix the size of the inlet, and for height, twice the depth of the stack. 3½ x 12 stacks should have 12 x 6 registers, 3½ x 10, 10 x 6 registers, etc. In old installations, it will be found that only the top half of the registers are emitting any air. There are

In modern systems inconspicuous returns are desirable. Many faces can be sunk in the baseboard



now registers on the market that claim an even distribution of velocity over the entire surface of the face. Recent tests have disclosed the necessity of "static" behind the average register to maintain an average velocity over the entire face area. This would mean in many cases that the grille or register be smaller than the stack. See Fig. 12. Where high velocities are required, this velocity must govern the size of the inlet.

Velocity sounds need not worry us as they are not perceived by the ear until 2,500 to 3,000 has been reached. Such velocities are not used in good design in residences.

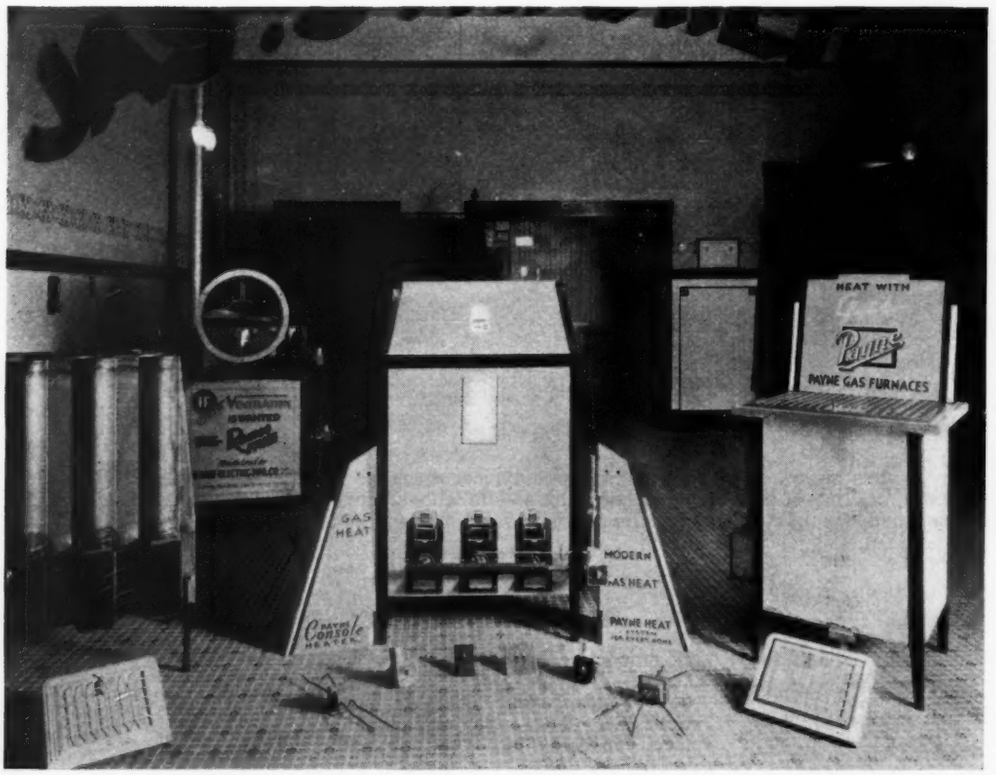
In comparing hot water or steam heating systems with warm air furnace systems, the hot water and steam plants have the advantage that their operation is not affected by wind pressures.

The above is taken word for word from a popular textbook on heating and ventilating. It is typical of all textbooks, and if we are honest with ourselves we must admit that it is the truth.

With the advent of the "forced air" or mechanical system this disadvantage has not been overcome. This is particularly true of recirculation systems. Let us visualize a living room with 300 square feet of outside wall and 50 square feet of glass area. Imagine a wind blowing against this surface at from 20 to 25 miles per hour. None of this surface except the window pane is air tight, and this window pane has a high conduction loss. The steam or hot water contractor locates his radiation against outside walls and below windows, and to a large extent overcomes this high heat loss before it penetrates the atmosphere of the room. Now what can the air conditioning engineer do about it?

It might be possible for the warm air contractor to use outside air and set up a slight pressure in the room but even this pressure would be less than the outside pressure as described above. Outside air is expensive to condition and of no benefit in extreme cases. This condition must be met by the experience and dexterity of the designer. As mentioned before, the location of inlets and returns, the velocity of the air at the inlet, its temperature, are all important factors in this fight to overcome this bad condition. Weatherstrip and insulation may help but they are not always available in old houses.

These articles on practical designing details are nearing their end. Perhaps we have omitted some points which you would like to see discussed. If so let us have an outline of the points you have in mind. We will do our best to answer such problems.



James Hamilton Finds Window Displays Sell His Products and Service

By **WILLIS PARKER**

THE majority of the warm air heating work done in Whittier Calif., and vicinity is done by James S. Hamilton. It is said that he does 98 per cent of all of the furnace work. Be that as it may, he claims that the attention he gives to his window and floor displays enables him to get a large proportion of his business through attracting the attention of and arousing the interest of the passersby.

"It is really a shame how negligent the sheet metal industry is of the sales possibilities of window displays," Hamilton declared. "Good window displays are just as essential in this business as they are in jewelry, groceries, women's wear and clothing—not to mention scores of other trades that have found them helpful. We never have rung doorbells in our efforts to increase our sales volume, and much of our business originates through passersby noticing our window displays."

Hamilton has adapted to his displays some of the best methods of department stores. This includes not only orderly arrangement of the merchandise, but also proper illumination and the use of special illumination fixtures, such as spot lights, flood lights, foot lights and color illumination.

A Typical Display

To explain some of these features for the benefit of other sheet metal workers, we submit the accompanying sketch, which is representative of a cross section of Hamilton's window, though it is not drawn to exact scale.

In addition to the overhead lighting system, there are flood lights which may be placed in the center of the transom bar, or to one side, or they may be placed on the floor to serve as foot lights.

A recent exhibit contained, in the very center, a modern gas furnace of the central heating type. Flanking it on one side was a floor heater, and on the other a heater of the console type. It was during the heating season, of course. But the furnace had been painted red, to increase its attractive appearance, and from the transom bar above and directly in front of it, was a flood light that centered the attention of passersby upon it because of its higher intensities of illumination

"By putting a red color shield over the flood light," Hamilton explained, "one can increase the 'warmth' of the exhibit because the red light emphasizes the red on the appliance. An amber light also strengthens the color of the apliance and gives it a more sunshiny atmosphere than red does, or even white. The only thing to guard

against in the use of a red light is reducing the visibility of the merchandise. One must have sufficient white light to make it easy for the passersby to distinguish all of the features of the exhibit and to read the messages upon any of the showcards used.

"Also, care must be taken in the use of colored illumination, not to throw a light upon an object of such a contrasting color that the two colors will clash and become muddy. For example, to throw a red light upon a green or blue object, or to throw a green or blue light upon this red furnace, would give it a muddy brown appearance that would not increase its interest-arousing properties.

"At one time we painted a furnace pure white, to match the finish on a line of electric refrigerators we were carrying. Upon this we could throw any color of illumination and get pleasing effects."

When the heating season is over, samples of sheet metal work are exhibited in the windows, but not in just the ordinary way. A background of a fence, composed of short lengths of guttering and conductor pipe, frequently is used. The fence posts may be ventilators on stacks.

Foot Lights

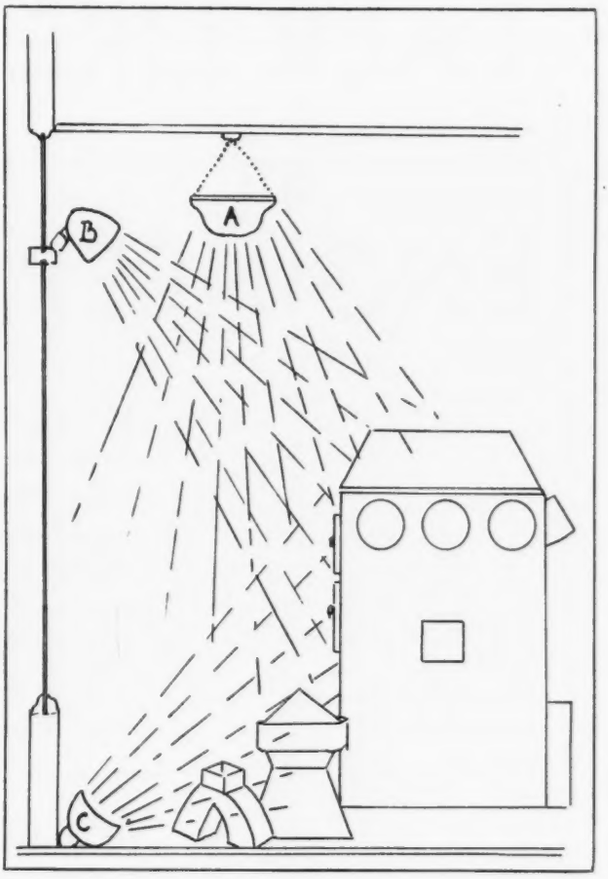
"When small objects, or objects not containing much height, are used," Hamilton explained, "it is practical to use some foot lights. This is because the overhead lights are so far above the merchandise that they do not fully illuminate it; whereas the foot lights serve as they do on the theater stage—to give more prominence to the lower portions of the actor's anatomy. Also, where the articles have under parts set back a bit from their upper parts, the shadows cast by the overhead lights would make it impossible for the passerby to discern the construction and outline of them. Hence, again the foot light should be used.

"We use spot lights and flood lights to point out the features of our exhibits. In a well constructed window display there may be several units, but one of them is, or should be, the feature. We can emphasize the feature by throwing a spot, or a flood, light upon it.

"Sometimes we can slightly shift the arrangement of the articles in the window and move the feature item to one side or the other, yet, the spot light, playing upon it, will make it stand out in prominence.

"Side lights also are good. Therefore we sometimes place a flood light on one side or other of the window and train its beams slantwise against the exhibit. This throws a high light on one side, a medium light on the front, and a shadow on the opposite side, thus giving the exhibit three dimensions.

"We have also found it practical to place in the window all of the fabricated metal to be used on a job and include a placard telling what job it goes on—if we should get the material worked up a short time before we have to install it."



The photograph on the first page of this article shows a typical Hamilton window display, featuring heating equipment. This sketch shows how such an exhibit is lighted by spot lights and foot lights to throw into relief the principal piece displayed. The article gives some excellent advice on type and colors of lights and how to install them

The selling of a contractor's service or products has undoubtedly reached the point where our industry must call upon merchandising ideas other industries have found advantageous. One such method is better window display. Good display must work at night as well as daytimes and to be effective lighting must be studied. The contractor in this story has worked out many interesting details our entire industry can profitably consider.

TALK LIKE an ENGINEER

By **L. R. HOLMES**
Heating Engineer

THERE has been a lot of talk of late regarding the advantage of selling warm air heating in terms that will make the customer realize that there is a world of information and specialized knowledge needed to properly design and install a warm air heating system.

Quite a number of warm air heating contractors have tried this out and found that it works wonderfully well. Their experience has been that the customer has a far healthier respect for the contractor and when sold feels that he has in his home the very latest in heating equipment. But the dealers who have tried out this plan have been scattered. More dealers ought to make use of this powerful selling appeal—the appeal of the latest and best.

That it can be used has been proved. That it will work in practically every case with the man of the house has also been proved.

Let's illustrate it by a specific example which is still being talked about in the community where it occurred. The hero of this tale is a warm air heating contractor—progressive and aggressive.

Early last Fall one of the community's best known citizens took advantage of low material and labor costs and built himself a new home. Of course he had to have a heating plant.

So he called in three of the local heating contractors, one of them a hot water man, the other two warm air men. The owner was open minded, but inclined toward a warm air system because he was an engineer and one of the things he had learned was that warm air, properly installed, is the best heating system.

If you want to impress the prospect with the fact that warm air heating is a highly technical business and that you are especially well qualified to give him the very latest and best.

The first contractor called was the hot water contractor. The second one called was the hero of the story. Now, this contractor knew that the owner had called in a hot water man and also knew that he not only had to sell his warm air installation against other warm air heating men, but that also he had to tell the story of warm air in such a way that the home owner would not buy hot water.

He spent several nights before his call thinking over all the things he knew about warm air. He went over these points in his mind until he felt certain that in presenting his story he would not overlook a single favorable point. But the big-best thing in his favor as he viewed it was the fact that this man was an engineer. What does an engineer think about and what points of the sales story would appeal to him? He determined upon a course of action and made himself perfect in its presentation.

When he reached the new house he had with him a set of standard code data sheets, a supply of pencils, a ruler, a tape measure, a chart showing the degree days of his community for a year past, a selection of registers and grilles in keeping with the architectural style of the house, a supply of catalogues giving all the engineering data relating to his equipment.

The heating man and the engineer started in to look the job over. The heating man got out his drawing sheets and outlined the house and its rooms. The engineer was invited to hold one end of the tape so that they would be sure to get all the dimensions right. Together they went over the house, room by room, until every room was accurately plotted on the sheets.

Then they went into the basement which the engineer had in mind to fix up into a combination basement and play quarters for the children. They sat down on nail kegs and the heating man started in on his story. He explained that the system of leads from the furnace should be balanced. This necessitated putting the furnace as near under the center of the house as possible. By placing it just a little to the front of the house they got it away from the stairs and out of the way.

Then the heating man began to tell the things he had determined would sell this customer. He gave the engineer a sheet of paper and both when through the calculations noted in the standard code sheets. Of course, the engineer wanted to know why and wherefore of about every other item. The heating man had the answer ready and explained

it. He also brought out the catalogues and showed the equipment. The engineer became so interested and enthusiastic that he insisted on a larger size in order to be sure he would not have to force his plant in bitter weather. They laid out the job. They selected a register and grille and the owner took them home to show his wife.

When they had finished the house builder knew a lot more about heating than he thought possible and had a healthier respect for the engineering skill which went into the figuring of a warm air plant. The contractor quickly gave his price for the job and being sure of a good impression added a legitimate profit.

The owner said he would let him know just as soon as possible.

About a week later the engineer came into the shop and said, "When can you start putting in that plant we figured?" The heating man told him in about four days. "All right," said the engineer, "go to it. You have the job and I want it put in just like we figured it out."

The plant was installed, the bill rendered and promptly paid.

But here is the real meat of the story. Several weeks later, one cold winter day, the engineer walked into the shop and said "That plant we laid out is certainly 100 per cent efficient. It heats my house regardless of outside weather and the other night when the temperature dropped to 10 below, I didn't even have to force the plant."

The heating man said he was glad it worked so well and that if any of the leads required a little adjustment of the dampers let him know and he would run out and regulate them.

Before the home owner left he got confidential. "You know," he said, "I didn't give that hot water man a real courteous reception. I let him figure because I had promised, but I knew that I probably wouldn't give him the job. I really felt guilty about it. But the funny thing about the job was the other two warm air men who came out. The first contractor after you came out, met me at the job, walked around the inside of the house, went down to the basement and took a look to see if he had head room, took a couple of good healthy puffs at his cigar and said, 'Well, I figure that I can give you a plant for —.'

"I almost fell over, for his price was more than $100 below your price. Of course I asked him what kind of provision he was making for this and for that and he was rather evasive. All I could get out of him was that he had put in furnaces for hundreds of houses like mine and what worked there certainly ought to work in my house. Perhaps it would, but how was I to know it?

"Then the third man came out. He was a smart young chap with a fine gift of gab. He did a lot of talking about his product. He told me what a fine piece of merchandise it was, what a big company his firm was, what a reputation for good work they had, and so on. I noticed all the time, however, that

(*Continued on page* 43)

Make the prospect feel that when he buys your heating system he is buying the very latest and best there is available. If he thinks the system is highly technical, and requires a high degree of skill and technical knowledge to design and install, he will want your system. It's just like buying an automobile—the buyer wants the car with the most doo-dads

. . . the problem corner

Sizing An Extreme Two-Branch Duct

SOME time ago we received from B. L. Schwartz a problem which demands in its solution careful engineering analysis and also a sound understanding of practical behavior of air in heating systems. A solution to this problem has been worked out by Platte Overton, Engineering Editor, and is presented so that readers who may have run across similar problems may see how the analysis was developed. Any questions or comments you may have are invited.

Mr. Schwartz said:

"I am now concerned with the many different plans proposed for sizing ducts in forced air heating work.

"Let us assume a condition calling for a duct with but two branches. Each outlet must provide for a delivery of the same heat total in B.t.u's. Register temperature and velocity to be 135 degrees and 200 F.P.M. respectively. Return air temperature to be 65 degrees.

"Will you please go through the various steps of the correct method for properly sizing these branches and main duct, making full reference to such tables and charts as enter into the method used. Also specifically itemize differences involved for basement, branch and riser portions for first, second and third floor rooms."

Following is Platte Overton's analysis:

Mr. Schwartz has indeed given us a problem. Here we have the basis of an interesting discussion, both theoretical and practical. Mr. Schwartz admits that his problem is extreme. However, if we succeed in solving the extreme problem practically, our everyday or average designing difficulties may be made easy.

Two methods of design will be discussed. The first theoretical. Some assumptions must be made, and these are shown in Fig. 1. For our theoretical analysis we will disregard temperature drop and assume an equal volume of air at both registers. We will further assume that the pressure drop in this duct will be .10 inch of water.

Our first step is to size the duct to .10 inch of resistance. Before we do this we must know our c.f.m. Air at 135 deg. F. and 9000

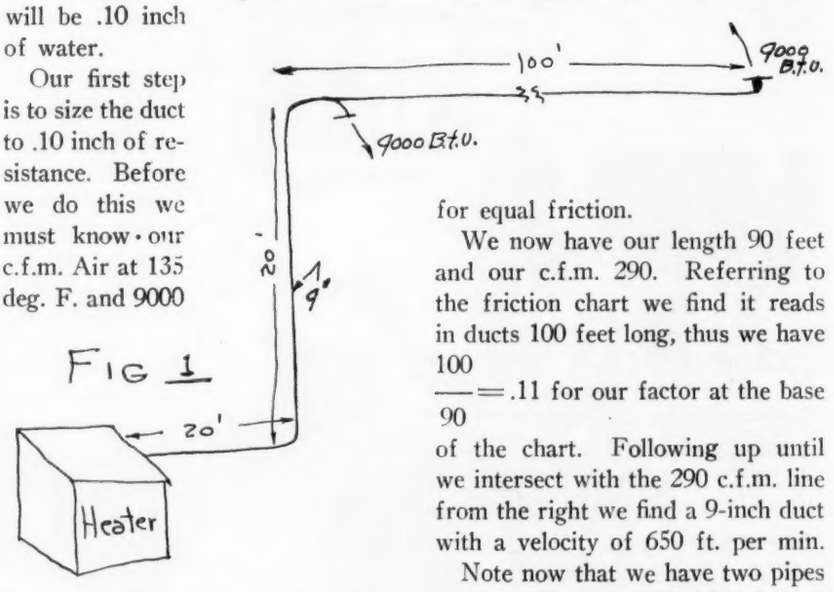


FIG 1

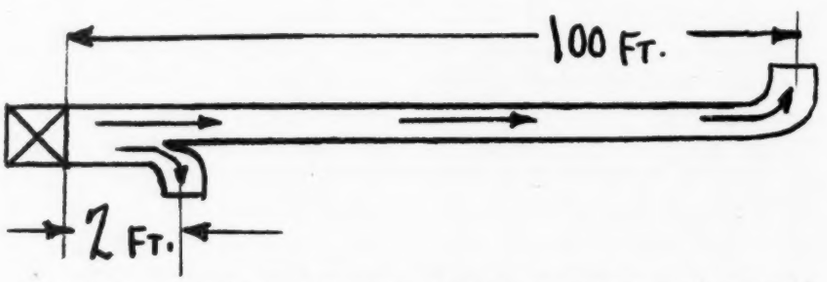
B.t.u. loss our c.f.m. will equal $\frac{9000}{62} = 145$ c.f.m. $\times 2$ equals 290 c.f.m. Our length from the first grille is $20 + 10 +$ (20 feet each for 3 elbows) $= 90$ feet equivalent length.

Note here that for ordinary long radius elbows we add 10 feet of length for each,, but that these elbows are at the base of the riser, at the top, and at an inlet where long sweeps are impossible. Also note that we measure from the first register and will design the 100-foot run to balance with the first inlet for equal friction.

We now have our length 90 feet and our c.f.m. 290. Referring to the friction chart we find it reads in ducts 100 feet long, thus we have $\frac{100}{90} = .11$ for our factor at the base of the chart. Following up until we intersect with the 290 c.f.m. line from the right we find a 9-inch duct with a velocity of 650 ft. per min.

Note now that we have two pipes to carry the same capacities, but of unequal length. One is approximately 2 ft. long, to which we add 20 feet for the elbow. The other 100 ft., to which we add 20 feet for one elbow.

We now refer to the table in Fig. 7* and find that one 9-inch duct is equal to two 7-inch ducts for equal friction. Our duct is now sized up to this point, Fig. 2.



This is the diagram of the problem submitted. If you have any solutions for this problem send us your diagrams and discussion.

To size this longer run to the same friction as the shorter one we use the formula

$$\frac{\dagger d2}{d1} = 5\sqrt{\frac{L2}{L1}}$$

where—

d2 = diameter of longer run in feet.

d1 = diameter of shorter run in feet = 7 inches = .583 feet.

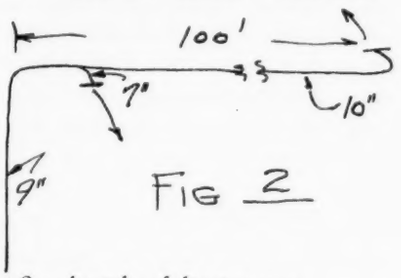


FIG 2

L2 = length of longer run.

L1 = length of shorter run.

Thus we have

$$d2 = d1 \times 5\sqrt{\frac{120}{22}} = .583 \times 5 \times \sqrt{\frac{120}{22}} = .583 \times 5 \times \sqrt{5.45} =$$

$.583 \times 1.4 = .8162$ ft. in diameter $= .8162 \times 12 = 9.79$ inches in diameter or 10" approx. Fig. 2 now completes our duct for size. The round ducts may now be changed to rectangular duct for equal friction per lineal foot.

Now for the practical design. Again our first problem is to establish our required c.f.m. With 98 feet of duct between our two registers it is obvious that the temperature will vary. Just what the drop will be will depend on conditions. The area, velocity, location, insulation, etc., are factors in this variation. We will assume that the duct is well insulated and has a loss of 9 B.t.u. per sq. ft. of duct.

For our volume at 135 degrees at the first register we have as before

$$\frac{9000}{62} = 145 \text{ c.f.m.}$$

For the far run we must add the B.t.u. loss of the duct. We have not calculated our duct size, but will make an approximation of 10x5 inches or 30 inches perimeter. Thus we have $100 \times 2.5 \times 9 = 2250$ B.t.u. duct loss + 9000 = 11,250 B.t.u.

Then $\frac{11{,}250}{62} = 181$ c.f.m. + 145 = 326 c.f.m. total.

Our inlet temperature at the far grille is $\frac{9000}{181 \times 1.07} + 70 = 116.5$ degrees or an 18.5 degree drop in 100 feet.

Our length 130 feet and a pressure drop of .10 inch and we determine our velocity by the formula

$$\ddagger V = \frac{1320}{\sqrt{F}}$$

where V = velocity in feet per min.

where §1320 = velocity corresponding to velocity pressure at .10 inch with air at 135 degrees F.

F = factor established by the formula

$$F = 2\tfrac{1}{2} + \frac{L}{4d} + \frac{N}{5}$$

where F = Total friction in terms of velocity head,

L = Greatest length of duct.

d = diameter of round pipe established by approximation from the friction chart.

N = Number of elbows not covered by the item 2½.

2½ = velocity heads lost at the pipe entrance from the plenum, at the base of the riser, and in the head and grille.

Thus we have

$$F = 2\tfrac{1}{2} + \frac{130}{4 \times 10} + \frac{1}{5} = 6.25$$

hence we have $V = \frac{1320}{\sqrt{6.25}} = \frac{1320}{2.5}$ = 530 feet per min.

Then $\frac{326}{530} = .615$ sq. ft. of duct = 11 inch duct approximately.

¶Referring to the chart for main and branch pipes for equal friction per foot of length we find 326 c.f.m. in 11" duct and our first branch requires 145 c.f.m. $= \frac{145}{326} = 44\tfrac{1}{2}\%$ of 11" duct = 7¾" duct. 181 c.f.m. = 55½% of 11" duct = 8½" duct.

Reduced to equivalent rectangular ducts we have

11 " duct = 18 × 6

7¾" duct = 8½ × 6 (This size refers to the opening from the main.)

8½" duct = 10½ × 6

Our grille size is then

$\frac{145}{200} + 15\% = .834$ sq. ft. = a register 15 × 8 inches.

$\frac{181}{200} + 15\% = 1.04$ sq. ft. = a register 19 × 8 (approx.).

It is obvious that the pressure in the duct at the first branch will be

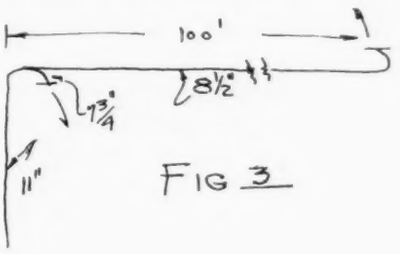


FIG 3

greater than at the far end with our opening of 8½ × 6 inches and no great length of duct to create resistance more than 44½% of the air will be delivered at this point, as the charts for the main and branch pipes for equal friction per ft. of length are based on all branches being fairly equal in length. To determine approximately the velocity for the velocity pressure at this point we may refer back and use the formula

$V = \frac{1320}{\sqrt{F}}$ and for our factor F we have to this length

$$F = 2\tfrac{1}{2} + \frac{30}{4 \times 7} + \frac{1}{5} = 4.05$$

and we obtain

$\frac{1320}{\sqrt{4.05}} = 660$ velocity in feet per min. approx.

$\frac{145}{660} = .22$ sq. ft. = 31.68 sq. in. for our opening from the duct or 6 × 5 ⅜" approx. in place of our 6 × 8½ inches.

For practical work we may use the 6 × 8½ inches and volume the inlet at the grille. Do not install a volume damper or splitter.

*Article in American Artisan, October 12, 1931.

†Article in American Artisan, October 12, 1931.

‡A. S. H. V. E. guide, 1932, page 457

§A. S. H. V. E. guide, 1932, page 541.

¶Article in American Artisan, Nov 9, 1931.

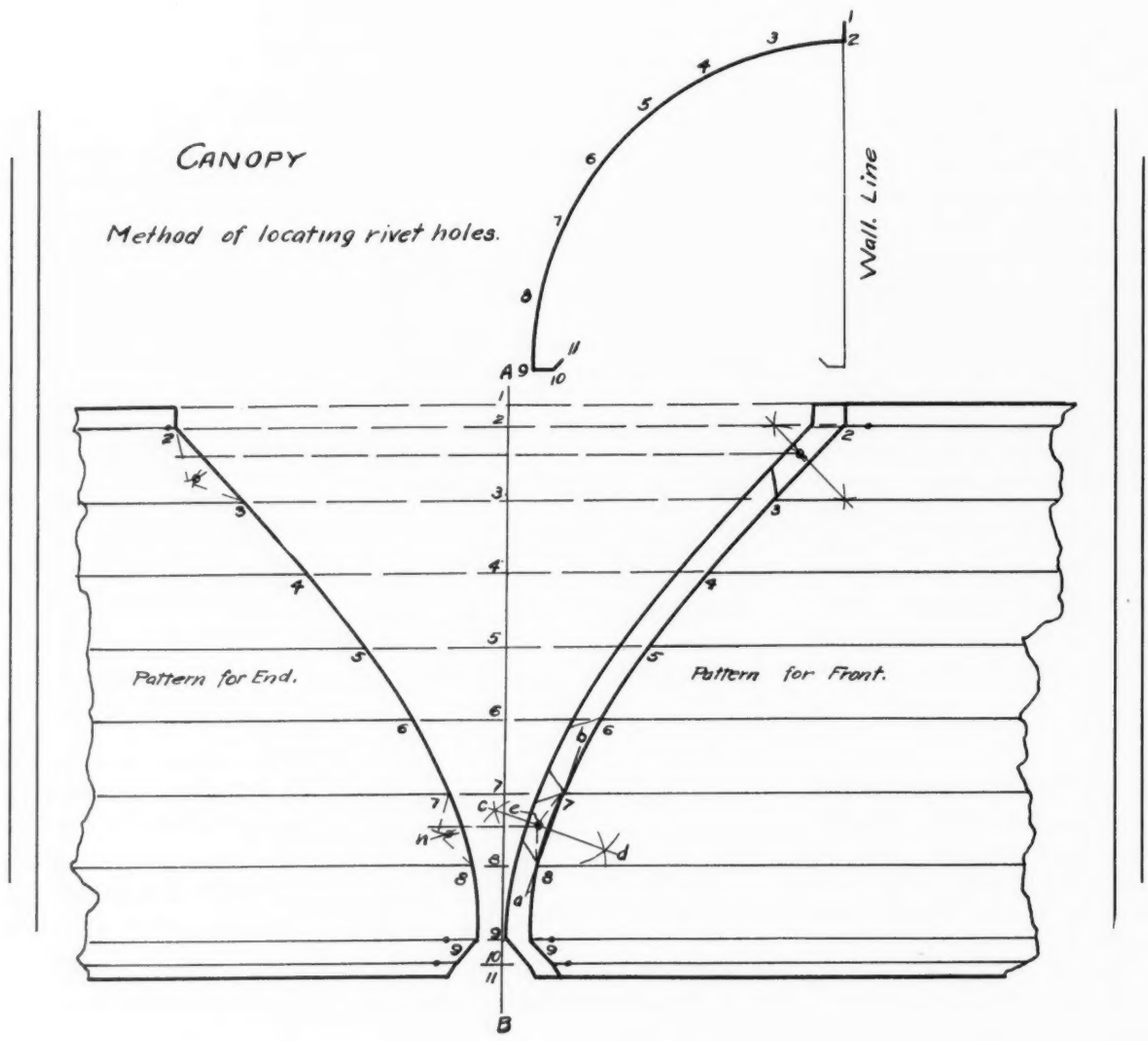
Rivet Holes on a Canopy

By **L. F. HYATT**
Contributing Editor

THE problem of laying out the rivet holes on the lap allowed on the front of a canopy so they would meet the holes on the ends was submitted by a Pittsburgh reader of the AMERICAN ARTISAN. This problem is often encountered in the heavier gauge metals. In this case it was 16 gauge.

The pattern is, of course, developed by the parallel line method and the allowance is added on both ends of the front. To illustrate the proceedure we have used only the distances 2-3, 3-4, 4-5, etc., for the purpose of locating the holes, but in practice the distances must be much shorter. To begin draw the line a-b very carefully through points 7 and 8 and erect perpendicular c-d to this line. Then step off one-half inch, this being one-half of the width allowed for the lap, thus locating the enter of the rivet hole as shown at e. Now take the distance from e to 7 or e to 8 as a radius and 7 and 8 on the pattern for the end as centers and strike arcs intersecting each other at point n thus locating the center of the corresponding rivet hole. A horizontal line is drawn from point e, which is the center of the rivet hole in the pattern for the front, to illustrate that the rivet holes in the end are lower than on the front. The rivet hole between 2 and 3 is also located and the horizontal line drawn across which shows that the rivet hole just located is much lower than the corresponding rivet hole on the front. It is evident from these two that the location of the holes will vary in each case.

It is important that all bends be made very carefully. The laps in the front may vary in length, as between 2 and 3 and 7 and 8 because the sharper the curve the more notches need to be made to permit bending the lap.



Distributor's News

Co-operation Proves Keynote of National Ass'n Sheet Metal Distributors Meeting

THE twenty-first annual meeting of the National Association of Sheet Metal Distributors, which was held May 11 and 12 in Philadelphia, proved to be one of the most comprehensive meetings held since the organization changed its name. Both in attendance and interest shown in the papers and discussions the two-day convention proved an outstanding success.

The keynote of the convention can be summed up in one word—Co-operation. Co-operation between distributer and the mills, between the distributer and the contractor and between distributers was thoroughly discussed during the convention.

Among the business problems of such importance that resolutions were adopted setting forth the organization's thought and wishes was the problem of dumping foreign steel in this country. This practice, so the distributers directly in contact with the practice declared, has become so prevalent and so much abused that concerted action must be taken to relieve the congested conditions in American mills and among eastern distributers caused by this inflow of material from other countries.

As a result of this thought a resolution was adopted which states:

RESOLUTION

WHEREAS, the dumping of foreign steel has created a serious menace to the economic recovery of the Steel Industry, due to the inadequacy of our tariffs to cope with the depreciated currencies of Europe and the competition price levels such depreciation have created, and

WHEREAS, in 1931 there were 45,000 net tons of flat rolled steel imported and 369,923 net tons of all classes of steel imported, thus causing a loss to the steel industry, with resultant loss to thousands of our workers who mine the ore, the coal operators and their employees, the loss of tonnage of railroads on the raw materials and coal, thus adding to the unemployment situation, and

WHEREAS, 257,130 men lost a week's work in 1931 due to the importation of all grades of steel, thus

A. W. Howe, President

reducing American earnings and purchasing power; therefore be it

RESOLVED: that the National Association of Sheet Metal Distributers in Convention assembled go on record as favoring such revision in the tariff as will give adequate protection to American industry, and be it further

RESOLVED: that our members be requested to communicate with their Senators and Representatives, and members of the Ways and Means Committee, urging that the Hawley Bill HR 8688 be brought before the House for serious consideration, and that this Resolution be spread on the records of this meeting.

There was also considerable discussion on the problem of how to discourage the sale of second sheets as primes by contractors wanting to shave another five dollars off their bid price. The problem, so members declared, goes deeper, in that some mills and distributers sell seconds for primes. To combat this practice a resolution was adopted commending those mills which plainly brand their second sheets and suggesting that every mill and every jobber likewise brand his second sheets so that there can be no chance for this deception to grow.

Officers elected for the coming year are listed in an adjoining column. In connection with the election of officers, the association presented a token of esteem to F. O. Schoedinger for his valuable and uncomplaining service as president during the past five years.

Quite surprising, from the observer's standpoint, was the feeling of optimism expressed in the meetings and among the small groups gathered throughout the hotel. While there was some minority expression of pessimism, especially as applied to the recent convolutions of congress and the government in general, all in all this pessimism was not dominating. The tariff, naturally, came in for discussion, especially on the various rulings which relate to foreign importations of material directly competing with American products.

G. Sumner Wilson

It might be said that the opening address of the convention, given by G. Sumner Wilson, President, National Hardware Association of the U. S., came pretty close to express-

ing the general attitude and trend of thought of the convention. Among other things Mr. Sumner said:

"It is difficult to be optimistic while attempting to navigate an uncharted course, yet this is a decidedly poor time for the pessimist to impart his thoughts. Most business leaders have been guessing. Economic authorities have been diagnosing, and politicians have been prognosticating. The popular subject, apparently, is prophesying the conclusion of the depression. 'Just around the corner' has developed into a vicious circle. Every means of defeating the conditions must be resorted to, by the organization of all our resources, and that indomitable spirit which has been truly American must assert itself to win.

"No business can continue indefinitely operating at a loss. Yet nearly all corporations have been and still are in that very unfortunate position. A recent article that I read sums up the situation quite correctly, as follows: 'Millions of persons are unemployed; thousands of businesses are in varying degrees of distress; prices of commodities, securities and services are at an abnormally low level; buying is slowed up; construction limited; credit is impaired; public finance disorganized, and a general condition of hesitancy and unrest is evident everywhere.' I read that statement to a friend of mine, whose immediate response was, 'The depression is over—the panic is here.'

Members Can Aid

"What can we do about it? We should first look to Washington, not for relief to ourselves, but to the entire country. Of course the national budget must be balanced, necessitating additional taxes upon business at a time when it is least able to bear them. Personally, I am in favor of a general manufacturers' sales tax, applied to all industry without any exemptions, as being the most equitable form of taxation.

"The next step would be for Congress to eliminate many Governmental activities. It is astounding to learn of the stupendous increases in Government expenses during the last ten years. Many of these activities can be dispensed with and many others postponed. In our own businesses we have all been obliged to reduce expenses and make many readjustments, no matter how unpleasant such changes were to us. Let Congress go one step further and insist upon a radical reduction in appropriations, then adjourn and go home.

"To my mind one of the most optimistic viewpoints is that we have been able to survive two and a half years of the worst business that most of us have ever experienced. We are going to continue. We are going to fight, with the result that we are bound to come out of all this better able to conduct our businesses, and thereby enjoy the fruits of our labor in adequate returns to compensate us for our work."

F. O. Schoedinger

One of the most stirring addresses of the entire convention was delivered on the opening morning by F. O. Schoedinger, now past president. In this address he said:

"Men are today nowhere nearly as sure of their ground or of themselves as they were a few years back. A great deal of the illusionment which grew out of the war and post-war prosperity is dissipating. Much of the present day trouble goes back to carelessness, conceit, and to over-confidence in superficials. One senses a definite turning backward to certain old-fashioned virtues which have been proved and tested by ages of experience. We know now that the millenium didn't dawn with the armistice, and that poverty wasn't abolished when the stock market went wild. We are beginning to realize some of the things we sneered at were not so bad, while some of those cheered were not so good.

"There is more unemployment than there has been for many years, and more distress; as a result, there is also more attention being paid to it. Time and time again the world has seen as large a percentage of people hungry but on few occasions has it tried to do so much. We have all learned something from this depression, something about ourselves as well as about other people. Apparently human nature has not arrived at a point where it can always resist the temptation of abusing privilege, overplaying opportunities and side-stepping disagreeable tasks.

"We are really fortunate that conditions have not been worse. Those who have borne the brunt of the burden in this country, who have actually faced want, have shown a surprising degree of patience. If someone had told us that we could go through such a widespread and unexpected series of disasters, without rioting and violence he would hardly have been believed.

"During the last 25 years the population of this country has increased 60 per cent. Its manufacturing resources have increased 300 per cent. The purchasing power of the 120 million people of America is greater than the purchasing power of the billions of Asia. This country has less than 6 per cent of the population of the globe, yet it produces 70 per cent of all the oil, 60 per cent of all the wheat and cotton, 50 per cent of all the copper and 40 per cent of all the lead and coal—yet we have less than three-fifteenths of the population of the globe.

Government is Master

"An appeal is being made at this time by the business men of our country to Congress. They are viewing with consternation the attitude of Congress toward public expenditures at this grave crisis in the nation's history. Idle men walk our streets; unused cars rest upon the sidings; incoming mails bring few orders. For a time there was evidence of returning confidence, but business is now paralyzed with fear. The employers of labor have staggered employment. Salaries and wages have been cut and dividends have been passed. We have dug down in our pockets for community funds. We have privately helped our relatives and friends. In the meantime a balanced budget, which is the nation's credit, recedes from view like a mirage.

OFFICERS FOR 1932

President—A. W. Howe,
J. M. & L. A. Osborn Co., Cleveland

Vice-Pres.—W. E. Bowe,
Herrick & Co., Boston

Executive Committee—

Robert H. Lyon,
Lyon, Conklin & Co., Baltimore

Executive Committee (3 yrs.)—

E. H. Hopfeld,
F. Dieckmann Co., Cincinnati

L. D. Mercer,
Republic Steel Co., Youngstown

"The trouble is our governments have become our masters. In Washington a power has risen up in the Government greater than the people themselves, consisting of many and various and powerful groups, combined into one mass by the cohesive power of self-interest.

"We have reached the point in our national life when Government employees have become so numerous and powerful that they dominate legislation and dictate their own salaries.

"Our appeal to Congress is: to forget parties, to forget blocs within parties, to turn a deaf ear to the manufactured clamor of special groups, and to think only at this solemn hour in terms of the whole people of our common country."

George H. Charls

Another address of importance was given by George H. Charls. He said:

"Is the idea of co-operation between the distributers and the mills just a sterile platitude, or is it, in reality, the bedrock upon which both must eventually build a mutually profitable relationship?

"There is but one basis upon which successful co-operation can truly exist and endure, and that is, when self-interest can be merged upon principles which insure to the fairly equal advantage of all parties concerned. Some compromise is inevitable, but any effort at co-operation which is not built upon these premises is doomed to failure.

"In 1927 the jobbers distributed between 15 and 16 per cent of the four million tons of sheets produced. In the next five years the sheet capacity has grown to eight million tons, and the jobbers distribute about 10 per cent of this capacity.

"In addition to this tremendous increase in productive capacity, there are four and a half million tons of hot rolled strip and almost a million and a quarter tons of cold rolled strip capacity which to a greater or less extent overlap and contribute to a demand formerly accruing to the sheet industry. So in the present situation we have to consider the flat rolled steel industry as representing thirteen million eight hundred and fifty thousand tons of finished material capacity.

"The outstanding need for immediate co-operation between the jobbers seems to be centralized in the dumping of foreign steel. This serious menace to the economic recovery is due to the inadequacy of our tariff to cope with the depreciated currencies of Europe and the competitive price levels such depreciations have created.

"There is one way to partly correct this situation, and that is urge your Congressmen and Senators, as well as the members of the Ways and Means Committee of Congress to bring before the House for serious consideration Hawley Bill H. R. 8688. We understand this bill will give adequate protection to American industry by a readjustment of duties to provide for the depreciated currencies of Europe and their effect upon foreign commodity prices.

"Possibly the second greatest need for co-operation between the distributers and the steel mills is the inauguration of a more aggressive sales campaign to increase the business of both.

"The majority of the mills leave the retailer and the dealer entirely to the distributer. These two factors in the channel of distribution form the final contact with the consumer. Who shall inspire, guide and direct the sheet metal and roofing dealer in a sales drive to create consumer demand?

"The newspapers are teeming with enticing advertisements, the air is saturated with sales appeal, and the nights are lighted with attractive signs of the distributers of almost every other product except steel, and the products made therefrom. How is the consumer to know of the bargain prices prevailing on his requirements demanding sheet steel? Allowing for advance in freight rates, five to nine dollars a ton lower than in 1913, for black and galvanized sheets. How can we ever hope to win our proper share of the consumer's dollar by figuratively folding our hands and complacently waiting for such part of the business as other industries have overlooked?

"The suction sweeper, the brush, the lightning rod, the refrigerator, the farm lighting, etc., salesmen are registering ten calls a day, with a thoroughly prepared stop-watch argument, but whoever thinks of soliciting a market of six million farms, with an annual purchasing power of twelve billion dollars in 1929, to sell the safest, most economical roofing, and the best for the money that the farmer can buy? How many have joined the Home Renovating Movement, or urged their dealers to do so? How many have attempted to create consumer demand for the sheets they sell to dealers?

"I am firmly convinced that if we go to work in earnest, give the name 'distributer' a new meaning, and have him inaugurate a vigorous campaign to induce his dealer to go out and initiate sales and get a larger share of the consumer's dollar, we will be distributing one and a half million tons annually instead of seven hundred and fifty thousand tons, the maximum that has ever moved through jobbing channels.

Distribution Plan Needed

"The third and equally important problem to be worked out by the mills and the jobbers is a plan of remunerative distribution in which all can concur.

"You are known as a National association, and yet jobbers between Seattle and Los Angeles, Texas and Wisconsin, Boston and New Orleans, compose the factors which demand equal consideration from the mills if they are to establish a national policy toward their distributers which will halfway satisfy all concerned.

"It would seem that before any satisfactory co-operation between the mills and jobbers can be obtained on a plan, the jobbers and the mills should co-ordinate their widely divergent ideas as to what constitute the functions of a jobber and his proper place in the distribution of sheets and roofing, as distinguished from the dealer and retailer.

"I know of nothing more important to the distributers than the working out of a jobbers' preferential which will encourage and permit them to function profitably and be in a position to put more power into the merchandising of sheets and roofing.

"Many plans have been tried, but for one reason or another have been forced to be abandoned. The mills are more than anxious to be fair, to find an enduring plan which will best insure profitable operations for the distributers of their products. It is my opinion that credits will eventually solve many of the seeming trends of distribution which are a matter of grave concern today.

"It is also obvious that credits for some time to come will require a scrutiny bordering upon personal acquaintance and intimate knowledge of the customer's character and business policies and most mills will prefer to leave to the jobber many accounts which the mills are illy-fitted to assume."

ASSOCIATION ACTIVITIES

Transition—Are You Awake?

By **GEORGE C. JOSLIN**

An Address Before the Ft. Wayne, Indiana, Association

AT the State Convention, we sang for you—(Did you say Sang—Yes, I said Sang). At least we tried to sing for you the Tinkers Chorus from Robinhood. It is the only song of our Craft which I have found. Tonight, I want to tell you not about the Tinkers Chorus, but about the Tinkers Dam. Ever hear of it? They say it isn't worth much. Well, from no less an authority than the Literary Digest, we learn that in times gone by, early Craftsmen were wont to mould a little wall of dough around a place to be flooded with coat of solder. The wall or dam could be used but once, after which it was thrown away. It is at once apparent how little value is attached to the Tinkers Dam. So thus, we clear our noble forebears of that naughty charge which has for so long marred their otherwise spotless reputation. It was not the damn (D-A-M-N) of profanity, but the dam (D-A-M) of dough which won proverbial prominence.

In our business, we have the Boot or Transition Piece—referring to a piece at the bottom where we change from one kind of pipe to another. This Business Hibernation is a Boot or Transition. We are at the bottom and changing from old practises to new. We are passing from a period of practically no improvements to an era of new ideas, inventions, improvements which pile up with such amazing rapidity that we can barely keep up.

Shop Equipment

For years, improvements in Sheet Metal Working Machines were practically negligible. With Sheet Metal problems of the Auto Industry, Manufacturers new to us came into the field. Niagara and Pexto brought out new and better designs for our machines. Unishear electrified the Hand Snip. The Advertising field needed inside cutting for letters. Unishear grew to a wierd "animal" with a great 54" throat and a tiny $\frac{1}{16}$" bite. Dreis & Krump are making brakes arranged to accomplish intricate bending feats. New equipment will appear to handle new metal problems.

TINNERS' TRIX

Now "Jewish Solder" is the stuff,
Be sure to use enough,
It patches up the holes for you
And makes the gutters new.
No Tinners' Art is needed tho'
To spread the stuff about.
Don't let this secret out.

We have another staunch ole friend
With which our work we mend
When furnace pipes refuse to meet,
It makes our job look neat.
ASBESTOS Paper is the stuff,
Be sure to use enough
As we go pasting on.

The Vacuum Cleaner is the fad,
The furnace needs it bad.
Now down each pipe a hose is put,
It goes in quest of soot.
The job is done, it's loads of fun,
The season's just begun,
And we'll go cleaning on.

Oh! Galvanized all looks the same,
It helps us play the game.
The lady says "Use Heavy Tin."
And then we take her in,
"Now Lady, Sure we'll treat ya fine,
We'll use *full* twenty-nine."
I guess we know our line.

If Tinners now are clever chaps,
They'll put on thinking caps,
They shouldn't wait until too late
To learn to Ventilate.
Hot-air will soon be ev'rywhere
An' folks don't want it there.
Will we go dreaming on?

CHORUS

Glory! Glory! Hallelujah,
Glory! Glory! What's it to ya?
Glory! Glory! How we fool ya
1. As we go smearing on. (Smear)
2. As we go pasting on. (Paste)
3. If we go cleaning on? (Suck)
4. As we go tinning on.
5. The hot air *will be gone!*

Metals

How long Toncan and Armco labored to sell the Quality Idea!! Horsehead Zinc proved to be the intermediate step up to Flexzinc—a Zinc which can be double seamed with or across the grain. Aluminum came in. Plain Copper now carries a finish almost polished. Galvannealed gives us the surface for metal work which is to carry beautiful paint finish. Seal-of-Quality, with its guaranteed all primes, full weight and 2-oz. Coating of Pure Zinc, gives us two-thirds more coating which will add years of life to Galvanized Roofing. For the Manufacturing trade, steels have been developed to meet practically any requirements: Drawing—Deep Drawing—Oven Lining—Enameling, etc. Look at these samples: Chromium Plated Steel, Zinc, Copper, Copper Plated Steel, Nickel Plated Steel, Copper. You are Sheet Metal Workers—these are Sheet Metals. What new uses will they create? Will you be posted as to their properties—their possibilities?

Tons of Monel have been used by Craftsmen who at first feared to cut into such a costly sheet. Stainless Steels have passed their introductory days. An Illinois Manufacturer of Soda Fountains placed twenty-five complete Stainless installations in Indianapolis last year. Our warehouse shipments of Stainless for this first quarter equaled those of the entire year 1931. If you, as a sheet metal worker, have not experimented with Stainless, you had better be getting some scraps to play with. In our home, a Monel Drainboard graces our kitchen and a Stainless Steel Tray enhances our baby's highchair. *Watch Stainless!* Both metals have their places and your customers have a right to expect you to adivse them correctly. Expensive ads like this will pave your way. Your jobbers will gladly give you helpful information regarding Fabrication, Soldering and Welding of Stainless Steels.

I wonder how many of you read the February 13th issue of the Literary Digest. Did you know that it carried a twenty-page Building Section. Read it! Get pepped up to the point where you will realize that the grass in the neighboring fields isn't even as green as that in your own. May I quote?—"In this Building Section, you are shown the strides made in such departments as Air-Conditioning, Heating, Ventilation, Refrigeration and Insulation which by their manifold improvements have rendered old practices obsolete." This is not a trade paper, but an outstanding publication of general news interest and amazing circulation.

Let's take *Heating*. Without question, there have been more advances and improvements in domestic heating during the last year than in any other division of home building or home equipment. You know what equipment is available. You know also that many customers will not be able to buy *complete* systems. It will be up to you to sell the best for the amount of money. Don't overlook temperature controls and booster fans. I wouldn't be without my little A-C Automatic Heat Booster. But for the man who can afford it, you have much to offer. I suggest, "Faint Heart Never Won," etc. Start *complete* and come down rather than underestimate the customer's buying power! Else you may cheat yourself out of nice installations. Here let me suggest that the part of the Heating System always in sight, is the Registers. Why don't furnace men realize this and neatly install good looking registers which will lend prestige to the job and please the home owner? Why do we let them beat us down to the cheapest? Where is our sales ability?

Air-Conditioning

You must buy this Digest. For fear you won't, I'll read this introduction. "Science and engineering have created a new era of physical benefit and happiness for millions who work or live indoors. It is the epoch of manufactured weather and is termed 'Air Conditioning.' No forward step in building progress is of more transcendent importance. Air-Conditioning is the creation of indoor weather which will contribute health and comfort to our lives at all seasons of the year. It is attained through combined regulation of *Temperature, Humidity, Cleanliness* and *Movement of Air.*"

I was recently at an Architects' luncheon. The three architects at my table did not know of my interest in this subject but talked it throughout the meal. One said, "I believe that within four years practically every home will have its Air-Conditioning System of some kind."

The April 17th Indianapolis Star carried this article by the Sales Manager of Ilg Electric & Ventilating Company. He cites a Five Billion Dollar Market for Air-Conditioning. *Bigger Than the Automotive Industry of* 1922. Do you realize that our Craft insufficiently posted as it is, knows more about handling air than any other craft? With this start, will we be the headlight to show the way or will we be the tail-light hanging on behind?

A housewife knows or cares little about whether the furnace is cast or steel, but she will pay $500.00 for a Baby Grand Piano which nobody in the home can play. She wants it because it adds *beauty* to the home. Is it such a far cry then to clean heating? Show this same lady that she can keep her draperies clean, avoid excessive dust on her floors and furnishings and she is interested. You are maintaining beauty in her home. You are talking her language.

The other day, a prominent business man said to me, "I should think the thousands of gravity furnace owners who bought in the past two years should feel as though they had been stung." Is your auto two years old? Does it have free wheeling and silent second? If not, are you sore at the fellow who sold it to you? NO! You are anticipating an up-to-date machine.

You say Air-Conditioning is much too costly? Yes, so was radio at first, but not now. Fortunes were made in radio in the meantime.

Ventilating

There is this less costly and closely related art—Ventilating. One big factor in Air-Conditioning is Air-Cooling. This is not successfully accomplished by desk fans. If the air is hot, get rid of it and replace it with fresher, cooler air. My! What a service we can render to the heat-suffering public. How little they know what we are about to spring on 'em!

Paul Jordan's Attic Ventilation may be the last word or the first step, but I'm sure it is a very important step in the right direction. Gravity Ventilation is so sure, so quiet and so cheap. It is a Metal-Workers Job. It gets you onto the roof where you can make valuable notes on conditions you find. Sale of Attic Ventilation requires nerve and stick-to-it-iveness as does any new sales promotion. But it has merit, remarkable potential sales possibilities.

I recently heard a discouraged Furmet remark "My house better be getting into some new lines because the Sheet Metal Trade can't wake up." Is this true? Can't you see the future looming more rosy than ever before our Craft? Transition!—Are You Awake?

Milwaukee Contractors To Hold Get Together

On June 1, 1932, members of the Milwaukee Sheet Metal Contractors Association will hold a get together with the representatives of the jobbers and manufacturers. The meeting will be held in the Builders Exchange, 774 North Broadway, at 8:30 p. m.

A portion of the program will be devoted to the projection of the American Brass Company film—"The Manufacture of Anaconda Copper." This will be followed by the get together program. Men intending to attend this meeting are requested to signify their intention to Paul R. Biersach, Secretary, 2371 North Grant Boulevard, Milwaukee, as early as possible.

Indianapolis Association Elects Officers

The Indianapolis Sheet Metal and Warm Air Heating Contractors' Association at a recent meeting elected the following officers:

President—Guy Lefforge.
Secretary—Harry B. Peterson.
Treasurer—William S. Waters.
Executive Secretary—Paul R. Jordan.

Talk Like An Engineer

(*Continued from page* 35)

he didn't seem to pay a lot of attention to the house itself. So I began to ask a few questions. You know those things we talked about while sitting on that nail keg seemed to stick in my mind and I must have asked him some surprising questions for in about five minutes I found that I knew a darned sight more about warm air heating than he did.

"And in spite of the fact that the figure for the job which was mailed me after the young man's visit was over, was a lot lower than yours was, I couldn't bring myself to even consider it. So you got the job and I just want to say that you did about the best bit of selling that day that I have seen in a long time. But, darn it, I knew that you was going to put that job in right and the last few weeks have proved it. More power to you."

That's selling.

CAN YOU TELL ME ?

"Walworth" Register

From Wood and Helmle, Springfield, Illinois.

Who manufactures the "Walworth" register?

Ans.: The Forest City Foundries Company, 2500 West 27th Street, Cleveland, Ohio.

—o—

From Eugene Moyemont, Odell, Illinois.

Please send addresses of concerns making enameled table tops for work tables.

Ans.: Benjamin Electric Mfg. Co., 120 South Sangamon Street, Chicago, Illinois; Ingram-Richardson Mfg. Co., Frankfort, Indiana; Vitreous Steel Products Corp., 6705 Grant Avenue, Cleveland, Ohio; Vitreous Enameling Corp., Cleveland, Ohio.

—o—

From Milton L. Kistler, Alexander City, Ala.

Where can I purchase brass stencils to solder on milk cans?

Ans.: C. H. Hanson Co., 303 West Erie Street, Chicago, Ill.; L. E. Larson, 673 West Madison Street, Chicago, Ill.

—o—

From Roland Coleman, Painesville, Ohio.

Where are key cutting machines made?

Ans.: Wankel Machine Co., 17 Battery Place, New York, N. Y.; Philadelphia Pin Key Duplicator Co., 220 South 10th Street, Philadelphia, Pa.; Beisser Key Machine Co., 407 East Fort Street, Detroit, Mich.; Corbin Lock Co., New Britain, Conn.; Yale & Towne, Stamford, Conn.; South Allentown Machine & Tool Works, Allentown, Pa.; Independent Lock Co., 70 Winter Street, Fitchburg, Mass.; Keil & Son, 401 East 163rd Street, New York, N. Y.; Russell Erwin Mfg. Co., New Britain, Conn.; Segal Lock & Hardware Co., Brooklyn, N. Y.; Harrison & Co., 209 Center Street, New York, N. Y.

—o—

From Ralph Teneyck, Lebanon, Indiana.

Could you tell me who manufactures brass draw off connections for large copper kettles?

Ans.: Consolidated Brass Co., 139 Summit Ave., Detroit, Mich.; Eskay Valve Co., 206 S. Jefferson St., Chicago, Ill.; Haydenville Co., Haydenville, Mass.; Kitson Co., Westmoreland and Stokley Sts., Philadelphia, Pa.; Peck Bros. & Co., 127 Chestnut St., New Haven, Conn.; Charles Perkes Co., 1508 N. Mascher St., Philadelphia, Pa.; Thos. Savill's Sons, Inc., N. E. Cor. Hancock and Huntingdon Sts., Philadelphia, Pa.

Where can I buy brass or copper angles and bands?

Ans.: American Brass Co., 1326 Washington Blvd., Chicago, Ill.; Revere Brass & Copper, Inc., 2200 Natchez St., Chicago, Ill.

—o—

From Capital City Culvert Company, Madison, Wis.

Will you kindly advise who is conducting a correspondence course in ventilation and warm air heating?

Ans.: St. Louis Technical Institute, 4543 Clayton Ave., St. Louis, Mo.; Carnegie Institute of Technology, Pittsburgh, Pa.

—o—

From Santa Fe Sheet Metal Works.

Where can we buy galvanized split pipe such as is used in restaurant work and also galvanized angle iron?

Ans.: Chicago Metal Manufacturing Company, 3724 S. Rockwell St., Chicago, Ill.

—o—

From H. O. Price, care of Clemens Rinderman, Freeport, Illinois.

Will you kindly furnish us with the names of some concerns who can furnish us with a sheet-metal and glass sign?

Ans.: Federal Electric Co., 225 N. Michigan Ave., Chicago, Ill.; Flexlume Illinois Sign Co., Inc., 1129 N. Dearborn St., Chicago, Ill.

—o—

From Brouillet Sheet Metal Works, Dubuque, Ia.

Please furnish us with a list of manufacturers of brass and aluminum name plates.

Ans.: Etching Co. of America, 1520 Montana St., Chicago, Ill.; General Etching & Mfg. Co., 3070 W. Grand Ave., Chicago, Ill.; C. H. Hanson Co., 303 W. Erie St., Chicago, Ill.; Stanley Mfg. Co., 64 W. Randolph St., Chicago, Ill.; Green Duck Co., 1729 W. North Ave., Chicago, Ill.

From C. B. Poage & Son, Sikeston, Mo.

We would like to know the names of manufacturers of crockery ware specially designed for food containers in steam tables.

Ans.: Imperial Crockery & Glassware Co., 5704 Wentworth Ave., Chicago, Ill.; Restaurant Supply Co., 1223 South Michigan Ave., Chicago, Ill.

—o—

From E. F. Stewart Company, St. Louis, Mo.

Would you be kind enough to advise us the names and addresses of the manufacturers of gasoline pressure tanks, located in Wisconsin?

Ans.: Milwaukee Reliance Boiler Works, Hadley and 32nd St., Milwaukee, Wis.; Pressed Steel Tank Co., Milwaukee, Wis.; Seamless Steel Products Corp., 27th and Greve, Milwaukee, Wis.; Allis-Chalmers Mfg. Co., Milwaukee, Wis.

Also kindly advise the name of the company located in Chicago that makes gasoline pressure tanks.

Ans.: John Wood Mfg. Co., 4435 S. Western Blvd., Chicago, Ill.; Acme Boiler & Tank Co., 48th and Morgan St., Chicago, Ill.; Chicago Steel Tank Co., Clearing, Ill.

—o—

From Woolwine Metal Products Co., Los Angeles, Calif.

Do you know of anyone who has a second hand power machine for forming wire bails for garbage cans and also wire bails and rings for water pails?

Ans.: Interstate Machinery Co., 130 S. Clinton St., Chicago, Ill.

—o—

Fron Shannon & Shannon, Iola, Kansas.

Can you give us names of firms manufacturing molds for use in making vases for parks, lawns, cemeteries, etc.?

Ans.: Artisan Mold Works, Elkhart, Ind.; Color-Creed Industries, Holland, Mich.; Consolidated Concrete Machinery Corp.; Alpena, Mich.; Modern Cast Products Co., 1222 S. 41st St., Louisville, Ky.

—o—

From Harding Metal Works, Rapid City, South Dakota.

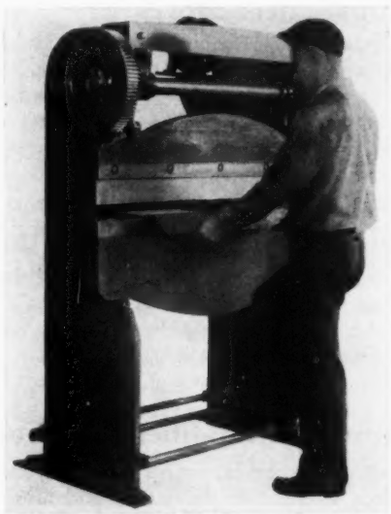
Where can we get nickel plated hardware for automobile trunks?

Ans.: Greene Engineering Co., Racine, Wis.; Milwaukee Stamping Co., 306 64th Ave., West Allis, Wis.

New PRODUCTS

New Chicago Steel Forming Press

Dreis and Krump Manufacturing Company, 74th Street and Loomis Boulevard, Chicago, announces a new press brake which is said to be a unique machine in that it is much smaller than other equipment of the same type. The total weight of the press brake is 2,100 pounds.



The machine is being offered at a price less than half other machines of similar capacity, but much greater weight.

The brake is claimed to be ideally adapted for the rapid forming of sheet metal sections such as in stoves, refrigerators, soda fountains, steel cabinets, metal furniture, steel boxes, store fixtures and a great variety of sheet metal specialties. Die holders are standard and the same dies can be used as on large press brakes.

The press is of steel throughout. Bull gear and pinions are steel. Bed is constructed of two pieces spaced ¾ inch apart permitting punchings to drop through to floor. All bearings are bronze bushed except the eccentric straps which are nickel cast. A single plate friction clutch is built integral with flywheel and is operated by foot treadle. Brake works automatically with clutch. Ram can be stopped at any point of up or down stroke by releasing treadle. The motor is mounted on adjustable hinged bracket and drives flywheel by means of V belts.

A New Steel Flooring

The development of a new steel flooring has been announced by Mellon Institute of Industrial Research, Pittsburgh, Pa. This flooring consists of slabs, 24 inches wide and up to 12 feet 5 inches in length at present, that are fabricated by performing two steel sheets and subsequently welding them together in the plane above the neutral axis. A cross-section taken through the width of a completed unit shows four keystone-shaped cells, all connected together near the neutral axis. These four ducts, which constitute each unit, are spaced at 6-inch intervals and connect directly, when installed, with the corresponding ducts of the adjacent section of floor slab. This arrangement is described as enabling the utilization of the new floor not only as an efficient load-carrying member, but also as a multiple floor-duct system for handling all types of electrical lines. Such a grouping of parallel cells with 6-inch space is claimed to permit, at any time, the installation of electrical outlets within a radius of three inches from the exact location required, thus providing permanent electrical flexibility and precluding electrical obsolescence.

New Welding Rods

Under the trade name of RegOroD, The Bastian-Blessing Company, 240 E. Ontario street, Chicago, has recently introduced a new line of welding rods and electrodes to be sold through their nation-wide organization of Rego Distributors. The line includes every popular type of rod such as high speed and high test materials.

The new RegOroD catalog is unique in that it is prepared in pocket size and not only gives a complete description of each rod but gives valuable information in reference to the proper rod for use in specific applications. It also contains a number of valuable tables for the use of the welder and welding engineer.

The Bastian-Blessing Company or any Rego Distributor will be glad to furnish on request a copy of this RegOroD catalog and handbook.

1932 National Super Service Cleaner

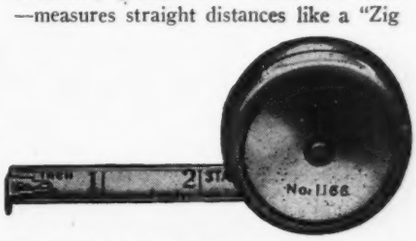
The National Super Service Company, Toledo, Ohio, announce their new 1932 Super Suction cleaner for heating plants, and a substantial price reduction. This with no deviation from their policy of the best in quality and skilled workmanship. The new model is 12 pounds lighter and the suction increase is 60 per cent. The motor, ½ horsepower plus, and all other parts are made in their factory and subjected to severe tests before and after assembly. The steel container holds one and one-quarter bushels (13½ gallons) and is quickly emptied, like a coal scuttle. The new-style big bag is designed to offer little back pressure. The unit is powerful, light, compact and easily portable up and down the narrowest stairways. It can be efficiently operated by one man. Literature and helps for cleaning campaigns will be supplied with cleaners.

Popular Priced Flexible Rigid Steel Rules

Two new Pull-Push rules—one to retail at $1.00 and another to retail at $1.50 are offered by The Stanley Rule & Level Plant. The two Pull-Push rules have a 6-foot steel blade that is both flexible and rigid, coiled in a watch size steel case.

The features as enumerated by the manufacturer are:

1. Flexible rigid steel blade—6 feet accurately graduated in inches and 16ths—measures straight distances like a "Zig Zag" rule and cylinders, curves and angular shapes as accurately as a steel tape.

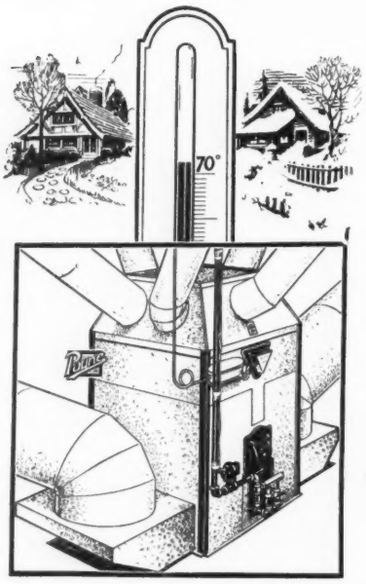


2. "Pull-Push" action—blade is always under control and can be easily set for any measurement—a light pull and out comes blade, a light push and in it goes.
3. Hook on end of blade for measuring beyond arms length.

NEW

Products are Necessary

There will be plenty of new business in 1932, but to secure it you will have to appeal to your buyers with NEW equipment which is abreast of the times. New convenience, new values and new ideas will go over BIG.



There are **9** Types of "Payneheat"

There are **9** Types of "Payneheat"

The New

PAYNE GAS FURNACES

need no introduction to the trade. Since 1914 Payne has made gas fired warm air furnaces exclusively. They are recognized. The new models have all the old superiorities of super economy, super durability and super dependability plus

NEW LOW PRICES

Be the Payne Dealer in Your City

Payne

PAYNE FURNACE & SUPPLY CO., INC.
Beverly Hills, California

Warehouse—Buffalo, N. Y. ● Jobbing Connections in Principal Cities
Dealers Everywhere

There's a Payne Heat System for Every Climate and Building

News Items . . . . . .

G. E. Air-Conditioning Department Organized

Announcement has just been made of the organization of an air-conditioning department within the General Electric Co. This department will market various electrical and other devices for house heating, humidifying and temperature control. One of the first products to be marketed by this new department will be a complete oil-burning furnace unit.

J. J. Donovan of Cleveland, formerly in charge of apartment house refrigeration sales, will be manager. Associated with him will be E. D. Harrington, of Schenectady, in charge of application engineering; J. R. Rue, of Pittsfield, in charge of manufacturing, and H. S. Woodruff, of Schenectady, in charge of design engineering. Headquarters will be maintained at the G. E. New York offices, 120 Broadway.

◆

Combustioneer Moves

In an attractive 28-page illustrated booklet Combustioneer announces the removal of its plant from Goshen, Indiana, to Springfield, Ohio, May 1st. The new address of the general offices is Columbia Street and Bechtel Avenue, and of the manufacturing plant, Columbia Street and Dakota Avenue, Springfield, Ohio.

◆

Change Indianapolis Labor Scale

Announcement is made through Joseph G. Gardner of the Indianapolis Local Sheet Metal Contractors' Association that starting May 1, 1932, the wage scale was reduced to $1.00 per hour. The new scale runs until April 30, 1933.

◆

Organize Automatic Humidifier Sales Co.

A new company, the Automatic Humidifier Sales Co., has been organized in Detroit to take over the international distribution of the products of the Automatic Humidifier Co. of Cedar Falls, Iowa.

K. M. Schaefer of Detroit, well known in specialty distribution channels, has been made president.

The Automatic Humidifier Sales Co. has two products, the Automatic Drip Humidifier, called "Humidrip," for use in warm air furnaces, and a newer device called the "Heatset," a combination furnace control. This "Heatset" consists of a tilting arm mounted on the side of the furnace and operated by a thermal-metal element which projects into the furnace. It is set at any desired point by a chain extending into the living quarters of a home—and after being set, regulates the drafts automatically according to the heating requirement. It is claimed to be the most simple and dependable mechanical regulator on the market.

Offices of the new Company are at 6560 Cass Ave., Detroit.

◆

The W. A. Whitney Manufacturing Company of 636 Race street, Rockford, Ill., is mailing a piece of literature describing and illustrating Whitney Lever Punches.

The booklet shows how all kinds of steel and iron construction which may present itself may be simplified by the use of the line of Whitney punches produced for almost any purpose where holes are to be punched. They range from the small hand punches to the larger lever punches used for channel iron.

The company will gladly send copies of the new folder on request.

News Items . . . . . .

Credit Men to Meet in Detroit

Credit executives of manufacturers and jobbers of plumbing and heating goods will hold a group conference June 21 in conjunction with the June 20-24 convention of the National Association of Credit Men in Detroit.

As chairman of the group conference, R. L. Griffiths, treasurer, International Heater Company, Utica, makers of furnaces and boilers, will present subjects of real interest to the heating and plumbing trade. He is assisted in preparing the program by a vice-chairman, L. J. Frost, Norman Boosey Mfg. Co., Detroit, makers of iron and brass plumbers' specialties.

Every business man whose responsibilities include the control of credits, will be interested in the views expressed regarding installment buying and its effects upon sound credit structure. Advantages and disadvantages of installment buying will be thoroughly discussed with relation to the expansion or deflation of the volume of installment selling.

"The Craze for Volume at the Expense of Wise Credit Extension" will be among the discussions which will tend to show that credit men are becoming more "sales conscious" in analyzing credit extension as applied to volume sales. Speakers will also talk of the trend toward the elimination of competition through the individual extension of credit facilities and demonstrate why this practice has been condemned by students of credit selling.

Training customers to develop "prompt pay" habits is another program topic. Experiences in this phase of improving credit conditions will be described. It is hoped to bring before the group definite information on credit investigation methods that will be applicable to local conditions and that may be used as a basis in any community for establishing credit limits.

◆

Gehri Eastern Office Moved to Syracuse

The Eastern Division office of A. Gehri & Co., manufacturers of furnace blowers and air-conditioning equipment, has been moved from Baltimore to 400 N. Midler Avenue, Syracuse, N. Y. F. MacDonald, who has been manager of the Eastern Division since the office was first established in Baltimore, retains that position in the new location.

◆

Donald M. Ryerson Dies

Donald Mitchell Ryerson, chairman of the board of Joseph T. Ryerson & Son, Inc., Chicago, died May 8 at his home at Lake Forest, Ill., aged 47. Because of ill health he had been inactive in the Ryerson company for many months, though retaining chairmanship of the board. His scientific and industrial training was made available to the government during the World War, when he supervised construction of submarine chasers and later attained the rank of lieutenant commander in overseas destroyer service. Mr. Ryerson was graduated from Yale University in 1907 and soon afterward entered the Ryerson Company, which was founded in Chicago in 1842 by his grandfather, Joseph T. Ryerson. He was vice-president and general manager in 1928, when he succeeded his father, the late Edward L. Ryerson, Sr., as chairman of the board.

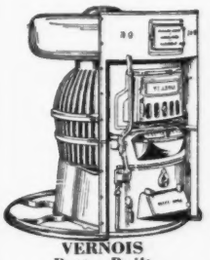
Your Customer receives *full value* in all

Vernois

PRODUCTS

That's Why They Are Easy to Sell

The success of VERNOIS Products is justified by their consistency of performance over a period of years. Every product in the VERNOIS line is the result of years of study of the problems encountered in service plus an excellence of materials unsurpassed. Their construction and manufacturing details are in the hands of workmen thoroughly familiar with the problems of the industry, assuring you of a customer well satisfied and a profit that will not be beaten down by call-backs because of any inferiority of workmanship or materials.



VERNOIS *Better Built* FURNACE

VERNOIS *Gas* RANGE

VERNOIS *Enameled* CIRCULATOR

Write for literature descriptive of the VERNOIS Line. Now more than ever before are people buying unquestioned value.

Every VERNOIS installation is a constant booster of your reputation.

MT. VERNON FURNACE & MANUFACTURING COMPANY

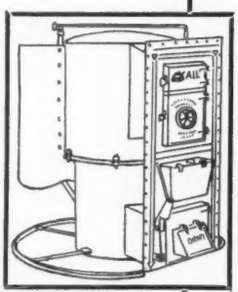
MT. VERNON ILLINOIS

Are You Sure You Have the BEST Furnace Line?

Can you convince the majority of your prospects that you have the most efficient unit? If so you have a decided edge over competition, and sales will mount. If you have the

X-L-ALL Steel Warm Air Furnace

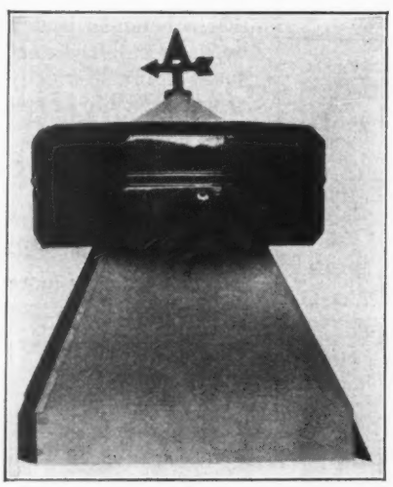
(Patent Applied For)



you have a product of radical departure. Everyone is quick to appreciate the economic advantages of the oversize combustion chamber and increased direct heating surface. For health, comfort, cleanliness and unusual new features of construction you'll declare there's no rival. Write for the X-L-ALL Furnace Book and dealer proposition today!

The Deshler Foundry & Machine Works
140-142 South East Avenue Deshler, Ohio

The
JORDAN ATTIC VENTILATOR



Straight flaring base. Sets low and looks well. Operated by gravity and wind action.
No. 17 — Capacity 15,000 cubic feet per hour.
No. 21 — Capacity 21,000 cubic feet per hour.

The Jordan Attic Ventilator presents an opportunity which offers profits to you *right now*. Write for information. There is summer business to be had and you can get it.

Backed by a complete engineering service.

PAUL R. JORDAN CO.
631 S. Delaware St., Indianapolis, Ind.

New Literature . . . .

"Sales-Promoter," New Paper by Motor Wheel

In order to bring about an interchange of merchandising ideas and sales experiences between dealers and to provide a semi-monthly contact between factory and dealer, Motor Wheel Corporation, Heater Division, Lansing, Mich., will publish the M-W Sales Promoter on the first and fifteenth of the month.

This new paper will be primarily devoted to the promotion of M-W Oil Burning Utility sales through its dealer organization and will include studies of, and plans for, the the most effective merchandising of its products.

A series of articles on pertinent questions of an engineering nature pertaining to the proper installation, adjustment and requirements of M-W Oil Burning Utilities, will cover chimneys, drafts, oil supply, hot water supply requirements, general installation pointers and other interesting and equally valuable subjects.

While the "Sales-Promoter" will be valuable from a sales and engineering standpoint, it will include as an important part of its makeup, news of dealer and factory activity as well as news of the oil burner industry not generally available through other sources.

◆

New Oil Burner Publications

Two publications of general interest to manufacturers and dealers engaged in the oil burner business and allied lines have just been completed by the American Oil Burner Association.

The first a "Five-Fold Trade Survey," is the result of a national canvass made by the Association looking into the many phases and angles of both manufacturing and selling.

The survey covers the following: 1. *Dealer Status* with respect to lines handled and types of heating systems favored. 2. *Gas and Stoker Competition* as it affects both dealer and manufacturer. 3. *Warm Air Supplemental Survey* giving status of firms engaged in the business and the fuels and equipment they favor.

The other publication is, "A Digest of Law and Cases on Heating Systems and Devices."

In explaining the usefulness of this volume and the reasons for its compilation, an announcement from the Association states:

"Frequent requests for help on legal problems, which were impossible to answer because of the research work necessary, prompted the Association to engage a capable lawyer to develop a digest of legal opinion and rulings as they apply to the oil burner industry.

"Not only can the work prove valuable in avoiding unforeseen litigation but it will prove to be equally helpful to counsel in establishing a satisfactory defense after litigation has begun."

◆

Rival Strap Corp. Sales Letter

The Rival Strap Corporation, 308 West 20th St., New York City, is mailing to the trade a "giant" letter as a part of their mail campaign to the dealer.

The folder closely resembles the company's regular correspondence and follows previous direct mail in its sales appeal. A number of "Fitrite" and "Rival" items are shown along the side of the letter. The sales angle stressed is that even such a small item as a strap may swing the competitive sale to the man with an attractive item.

Copies of the letter can be secured from the company.

Breuer's Ball Bearing
1932 TORNADO FURNACE CLEANER

Complete With These 10 Attachments

Now Reduced to **$139.50** *F. O. B. Chicago*

WHAT GOOD IS A FURNACE CLEANER WITHOUT THE RIGHT TOOLS?

You must have all of these 10 tools to clean thoroughly all types of warm air furnaces and hot water boilers. $29.75 worth of extra attachments—that's what you get with a TORNADO Furnace Cleaner at no additional cost! They save approximately one hour on every cleaning job. Think what this means to you in extra profits.

Actually a one man outfit—100 per cent portable—weight only 30 pounds.

Far greater vacuum cleaning power—proved by comparison—½ H.P. G.E. Motor—ball bearing throughout—no oiling.

Removes all loose dirt from air system without taking down pipes—an exclusive BLOWER feature of the TORNADO.

We invite comparison of the TORNADO ***point for point—price, portability, weight AND POWER.*** We will ship the TORNADO on three days' free trial—no obligation—so that you can test our claims.

And you will want our new sales plan book that shows you how to go into the furnace cleaning business and earn profits that pay for the TORNADO in a few weeks. Write today.

BREUER ELECTRIC MFG. CO.
865 BLACKHAWK STREET CHICAGO, ILLINOIS

MARSHALLTOWN THE MARSHALLTOWN LINE **SHEARS**

No. 18

SPECIFICATIONS

CAPACITY—
18 gauge and lighter—1¾" radius.

CUTTERS—
2"x1½"—high grade tool steel. Slightly knurled to feed material.

ADJUSTMENT—
One bolt. Instructions furnished.

SIZE AND MATERIAL—
Height 19½"; head cast iron; base cast iron; gears steel and cast iron. Shipping weight 45 lbs.

SHEARS THAT CUT

That's what you're looking for—shears that will save money for you—shears that stand the gaff.

Install at least one type of Marshalltown throatless shears in your shop. Do it now!

SHEARS FOR EVERY JOB: CUTTING CAPACITY UP TO ½".

The MARSHALLTOWN line is complete—a shear for every use.

THE CATALOGUE TELLS THE STORY—WRITE FOR IT

MARSHALLTOWN MFG. CO. MARSHALLTOWN IOWA

Have Your Trunk Ducts and Branches Designed by Overton for 40c Per Warm Air Grille!

Dealers can save from $50.00 to $100.00 on each job in material and labor alone, through using scientifically designed trunk lines and branches. The time saved in an attempt to balance a poorly designed system will more than pay for the cost of my engineering service.

NOTE THESE PRICES!

RESIDENCES

Up to and including 5 rooms	$1.10 per room
5 to 9 rooms inclusive	$1.00 per room
10 to 15 rooms inclusive	$0.85 per room
16 to 20 rooms inclusive	$0.80 per room
21 rooms and over	$0.75 per room

CHURCHES

Up to and including 50,000 cu. ft. gross content	$0.12 per 1,000 cu. ft.
50,000 cu. ft. and over	$0.10 per cu. ft.

SCHOOLS

20,000 to 50,000 cu. ft	$0.30 per 1,000 cu. ft.
50,000 to 70,000 cu. ft	$0.25 per 1,000 cu. ft.
70,000 to 100,000 cu. ft	$0.20 per 1,000 cu. ft.
100,000 cu. ft. and over	$0.15 per 1,000 cu. ft.

FACTORIES, GARAGES

Duct systems	$0.12 per 1,000 cu. ft. gross content
Unit heater systems	$0.10 per 1,000 cu. ft. gross content

SPECIAL NOTE

Where heating systems include filters, washers, temperature control as EXTRA EQUIPMENT—add 20 per cent to listed prices.

Where filters, washers, temperature controls are A PART OF THE HEATER AND ARE UNDER ONE CASING—listed prices apply.

For complete working plans detailing all trunk lines in ¼-inch scale and showing details of elbows, stacks, branches, sections, cross sections of walls—add 50 per cent to list prices.

Add $0.01 per square foot of direct radiation for combination systems.

Also Steam, Hot Water, Vapor Systems—1c per Square Foot of Radiation

PLATTE OVERTON *Consulting Engineer* **2100 City Hall Square Building, Chicago**

Order Only Genuine Agricola REPAIR PARTS

Only genuine AGRICOLA Repair Parts assure perfect fitting castings. Prompt shipments.

AGRICOLA FURNACE CO., Inc.
Gadsden, Alabama
Offices in principal cities

NEW MODEL "C"
COLUMBUS HUMIDIFIER

List Price $15.00
COMPLETE READY TO INSTALL

Write today for folder and discount
THE COLUMBUS HUMIDIFIER CO.
1 E. 5th Avenue, Columbus, Ohio

A UNIT THAT PRODUCES PROFITS

Write for full information and our catalog.

Then set out to develop this business in your territory.

A-C MANUFACTURING CO.
417 Sherman Ave.,
Pontiac, Ill.

MERCHANDISING
Gutters and Down Spouts

In the June issue, AMERICAN ARTISAN will inaugurate a campaign devoted to the merchandising of gutters and down spouts. In this article will be published sales helps which have been in practical use; sales letters; local newspaper advertising; all coming at a time in the season when they will be of most value to you.

Watch for this Article

BUYERS' GUIDE

AIR CLEANERS
American Air Filter Co., Inc., Louisville, Ky.
Owens-Illinois Glass Co., Toledo, Ohio

AIR CONDITIONERS
(See Unit Air Conditioners)

AIR WASHERS
Health Air Systems, Ann Arbor, Mich.
Hess Warming & Vent. Co., Chicago, Ill.
Meyer Furnace Co., The, Peoria, Illinois.

ASBESTOS COVERING AND PAPER
Standard Asbestos Co. of Chicago, Chicago, Ill.

BLAST GATES
Berger Bros. Co., Philadelphia, Pa.

BLOWERS
Health-Air Systems, Ann Arbor, Mich.
Hess Warming & Vent. Co., Chicago, Ill.
Henry Furnace & Fdy. Co., Cleveland, Ohio
Meyer Furnace Co., The, Peoria, Illinois.

BRAKES—BENDING
Dreis & Krump Mfg. Co., Chicago, Ill.
Interstate Machinery Co., Chicago, Ill.

BRAKES—CORNICE
Dreis & Krump Mfg. Co., Chicago, Ill.
Interstate Machinery Co., Chicago, Ill.

BRASS AND COPPER
American Brass Co., Waterbury, Conn.
Revere Copper and Brass, Inc., Rome, N. Y.

BURNERS—OIL
Laco Oil Burner Co., Griswold, Iowa

CASTINGS—MALLEABLE
Berger Bros. Co., Philadelphia, Pa.
Fanner Mfg. Company, Cleveland, Ohio

CEILINGS—METAL
Globe Iron Roofing and Corrugating Company, Cincinnati, Ohio
Milcor Steel Co., Milwaukee, Canton, Chicago, LaCrosse, Kansas City.

CEMENT—FURNACE
Milcor Steel Co., Milwaukee, Canton, Chicago, LaCrosse, Kansas City.

CHAIN—FURNACE
Hart & Cooley Mfg. Co., Chicago, Ill.

CHAPLETS
Fanner Mfg. Company, Cleveland, Ohio

CLEANERS—FURNACE VACUUM
Breuer Elec. Mfg. Co., Chicago, Ill.
Brillion Furnace Co., Brillion, Wis.
Densmore & Quinlan Co., Kenosha, Wis.
National Super Service Co., Toledo, Ohio

CONDUCTOR ELBOWS AND SHOES
Barnes Metal Products Co., Chicago, Ill.
Berger Bros. Co., Philadelphia, Pa.
Brown Wales Co., Boston, Mass.
Globe Iron Roofing & Corrugating Co., Cincinnati, Ohio
Milcor Steel Co., Milwaukee, Canton, Chicago, LaCrosse, Kansas City

CONDUCTOR FITTINGS
Barnes Metal Products Co., Chicago, Ill.
Berger Bros. Co., Philadelphia, Pa.
Brown Wales Co., Boston, Mass.
Globe Iron Roofing & Corrugating Co., Cincinnati, Ohio
David Levow, New York, N. Y.
Milcor Steel Co., Milwaukee, Canton, Chicago, LaCrosse, Kansas City.
Rival Strap Corp., New York, N. Y.

CONDUCTOR PIPE
Barnes Metal Products Co., Chicago, Ill.
Berger Bros. Co., Philadelphia, Pa.
Brown Wales Co., Boston, Mass.
Globe Iron Roofing & Corrugating Co., Cincinnati, Ohio
Milcor Steel Co., Milwaukee, Canton, Chicago, LaCrosse, Kansas City.

COPPER
American Brass Co., Waterbury, Conn.
Brown Wales Co., Boston, Mass.
Revere Copper & Brass, Inc., Rome, N. Y.

CORNICES
Globe Iron Roofing & Corrugating Co., Cincinnati, Ohio
Meyer & Bro. Co., F., Peoria, Ill.
Milcor Steel Co., Milwaukee, Canton, Chicago, LaCrosse, Kansas City

CRIMPING MACHINES
Bertsch & Company, Cambridge City, Ind.
Interstate Machinery Co., Chicago, Ill.

CUT-OFFS—RAIN WATER
Barnes Metal Products Co., Chicago, Ill.
Meyer & Bro. Co., F., Peoria, Ill.
Milcor Steel Co., Milwaukee, Canton, Chicago, LaCrosse, Kansas City

DAMPERS—QUADRANTS—ACCESSORIES
Aeolus Dickinson, Chicago, Ill.
Hart & Cooley Mfg. Co., Chicago, Ill.
Milcor Steel Co., Milwaukee, Canton, Chicago, LaCrosse, Kansas City
Parker-Kalon Corp., New York, N. Y.
Young Ventilating Co., Cleveland, Ohio

DIFFUSERS—AIR DUCT
Aeolus Dickinson, Chicago, Ill.

DRIVE SCREWS—HARDENED METALLIC
Interstate Machinery Co., Chicago, Ill.
Parker-Kalon Corp., New York

EAVES TROUGH
Barnes Metal Products Co., Chicago, Ill.
Berger Bros. Co., Philadelphia, Pa.
Brown Wales Co., Boston, Mass.
Globe Iron Roofing & Corrugating Co., Cincinnati, Ohio
Milcor Steel Co., Milwaukee, Canton, Chicago, LaCrosse, Kansas City

EAVES TROUGH HANGERS
Barnes Metal Products Co., Chicago, Ill.
Berger Bros. Co., Philadelphia, Pa.
Milcor Steel Co., Milwaukee, Canton, Chicago, LaCrosse, Kansas City

FANS—FURNACE
A-C Mfg. Company, Pontiac, Illinois

FILTERS—AIR
American Air Filter Co., Inc., Louisville, Ky.
Owens-Illinois Glass Co., Toledo, Ohio

FILTERS—FURNACE
American Air Filter Co., Inc., Louisville, Ky.
Owens-Illinois Glass Co., Toledo, Ohio

BUYERS' GUIDE

FLUXES—SOLDERING

Kester Solder Company, Chicago, Ill.

FORMING ROLLS

Bertsch & Company, Cambridge City, Ind.
Interstate Machinery Co., Chicago, Ill.

FURNACE CLEANERS

(See Cleaners—Furnace Vacuum)

FURNACES FOR GAS OR OIL

Dail Steel Products Co., Lansing, Mich.
Health-Air Systems, Ann Arbor, Mich.
Henry Furnace & Foundry Co., Cleveland, Ohio.

FURNACES—GAS

Forest City Foundries Co., Cleveland, Ohio
Henry Furnace & Foundry Co., Cleveland, Ohio
Interstate Machinery Co., Chicago, Ill.
Lennox Furnace Co., Marshalltown, Iowa
Meyer Furnace Company, Peoria, Ill.
Payne Furnace and Supply Co., Beverly Hills, Calif.
Round Oak Furnace Co., Dowagiac, Mich.

FURNACES—GAS AUXILIARY

Forest City Foundries Co., Cleveland, Ohio

FURNACES—OIL BURNING

Meyer Furnace Co., The, Peoria, Illinois.
Motor Wheel Corp., Heater Div., Lansing, Mich.

FURNACES—WARM AIR

(See Also Unit Air Conditioners)

Agricola Furnace Co., Gadsden, Ala.
Andes Range & Furnace Corp., Geneva, N. Y.
Brillion Furnace Co., Brillion, Wis.
Dail Steel Products Co., Lansing, Mich.
Deshler Foundry & Machine Works, Deshler, Ohio
Floral City Heater Co., Monroe, Mich.
Forest City Foundries Co., Cleveland, Ohio
Health-Air Systems, Ann Arbor, Mich.
Henry Furnace & Fdy. Co., Cleveland, Ohio
Hess Warming & Vent. Co., Chicago, Ill.
Lennox Furnace Co., Marshalltown, Iowa
May-Fiebeger Co., The, Newark, Ohio.
Meyer Furnace Co., The, Peoria, Illinois
Motor Wheel Corp., Heater Div., Lansing, Mich.
Mt. Vernon Furnace & Mfg. Co., Mt. Vernon, Ill.
Payne Furnace & Supply Co., Beverly Hills, Calif.
Peerless Foundry Co., Indianapolis, Ind.
Round Oak Furnace Co., Dowagiac, Mich.

GAGES—DRAFT

Ellison Draft Gage Co., Chicago, Ill.

GRILLES

Auer Register Co., Cleveland, Ohio.
Harrington & King Perforating Co., Chicago, Ill.
Hart & Cooley Mfg. Co., Chicago, Ill.
Independent Register & Mfg. Co., Cleveland, Ohio.
Meyer & Bro. Co., F., Peoria, Ill.
Rock Island Register Co., Rock Island, Ill.
United States Register Co., Battle Creek, Mich.

GUARDS—MACHINE AND BELT

Harrington & King Perforating Co., Chicago, Ill.

HANDLES—BOILER

Berger Bros. Co., Philadelphia, Pa.

HANDLES—FURNACE DOOR

Fanner Mfg. Co., Cleveland, Ohio.

HANDLES—SOLDERING IRON

Parker-Kalon Corp., New York, N. Y.

HEATERS—CABINET

Agricola Furnace Co., Gadsden, Ala.
Motor Wheel Corp., Heater Div., Lansing, Mich.
Mt. Vernon Furnace & Mfg. Co., Mt. Vernon, Ill.
Payne Furnace & Supply Co., Beverly Hills, Calif.

HEATERS—SCHOOL ROOM

May-Fiebeger Co., The, Newark, Ohio.
Meyer Furnace Company, The, Peoria, Ill.

HUMIDIFIERS

Automatic Humidifier Co., Cedar Falls, Iowa.
Columbus Humidifier Co., Columbus, Ohio
Hess Warming & Vent. Co., Chicago, Ill.
Meyer & Bro. Company, F., Peoria, Ill.
Sallada Mfg. Co., Minneapolis, Minn.

MACHINERY—CULVERT

Bertsch & Co., Cambridge City, Ind.
Interstate Machinery Co., Chicago, Ill.

MACHINERY—REBUILT

Interstate Machinery Co., Chicago, Ill.

MACHINES AND TOOLS—TINSMITH'S

Bertsch & Company, Cambridge City, Ind.
Brown Wales Co., Boston, Mass.
Dreis & Krump Mfg. Co., Chicago, Ill.
Interstate Machinery Co., Chicago, Ill.
Marshalltown Mfg. Co., Marshalltown, Iowa.
Parker-Kalon Corp., New York, N. Y.
Viking Shear Co., Erie, Pa.
Whitney Mfg. Co., W. A., Rockford, Ill.

METAL LATH—EXPANDED

Barnes Metal Products Co., Chicago, Ill.
Milcor Steel Co., Milwaukee, Canton, Chicago, LaCrosse, Kansas City.

MITERS

Barnes Metal Products Co., Chicago, Ill.
Berger Bros. Co., Philadelphia, Pa.
Milcor Steel Co., Milwaukee, Canton, Chicago, LaCrosse, Kansas City.

NAILS—HARDENED MASONRY

Interstate Machinery Co., Chicago, Ill.
Parker-Kalon Corp., New York, N. Y.

PERFORATED METALS

Harrington & King Perforating Co., Chicago, Ill.

PIPE AND FITTINGS—FURNACE

Henry Furnace & Fdy. Co., Cleveland, Ohio.
Meyer & Bro. Co., F., Peoria, Ill.
Milcor Steel Co., Milwaukee, Canton, Chicago, LaCrosse, Kansas City.
Peerless Foundry Co., Indianapolis, Ind.

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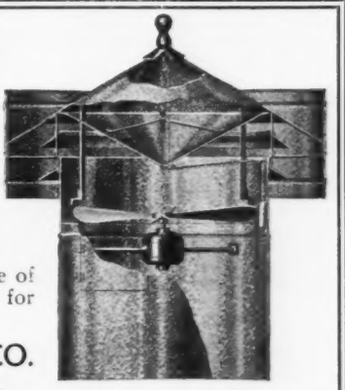

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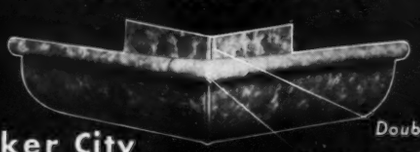

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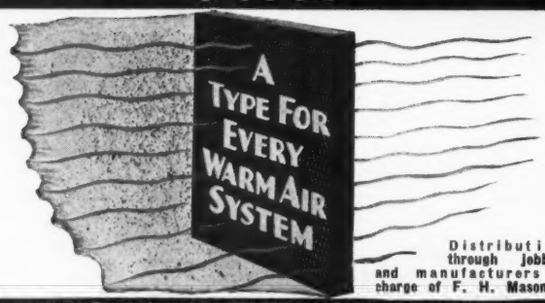

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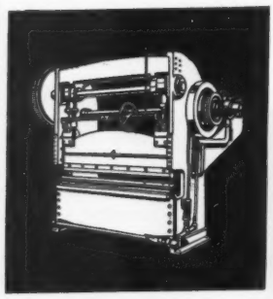

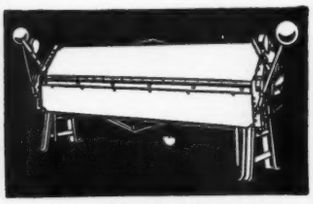

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PULLEYS—FURNACE

Hart & Cooley Mfg. Co., Chicago, Ill.

PUNCHES

Bertsch & Co., Cambridge City, Ind.
Interstate Machinery Co., Chicago, Ill.
Parker-Kalon Corp., New York, N. Y.
W. A. Whitney Mfg. Co., Rockford, Ill.

PUNCHES—COMBINATION BENCH AND HAND

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Parker-Kalon Corp., New York, N. Y.

PUNCHES—HAND

Interstate Machinery Co., Chicago, Ill.
Parker-Kalon Corp., New York, N. Y.
W. A. Whitney Mfg. Co., Rockford, Ill.

RADIATOR CABINETS

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Meyer & Bro. Co., F., Peoria, Ill.

REGISTERS

Auer Register Co., Cleveland, Ohio.
Forest City Foundries Co., Cleveland, Ohio.
Hart & Cooley Mfg. Co., Chicago, Ill.
Henry Furnace & Fdy. Co., Cleveland, Ohio.
Independent Register & Mfg. Co., Cleveland, Ohio.
Meyer & Bro. Co., F., Peoria, Ill.
Milcor Steel Co., Milwaukee, Canton, Chicago, LaCrosse, Kansas City.
Peerless Foundry Co., Indianapolis, Ind.
United States Register Co., Battle Creek, Mich.

REGISTERS—WOOD

Auer Register Co., Cleveland, Ohio.
Milcor Steel Co., Milwaukee, Canton, Chicago, LaCrosse, Kansas City.
United States Register Co., Battle Creek, Michigan.

REGULATORS—AUTOMATIC HEAT

Hart & Cooley Mfg. Co., Chicago, Ill.
Minneapolis-Honeywell Regulator Co., Minneapolis, Minn.

REPAIRS—STOVE AND FURNACE

Des Moines Stove Repair Co., Des Moines, Iowa.
Northwestern Stove Repair Co., Chicago, Ill.
Peerless Foundry Co., Indianapolis, Ind.

RIDGING

Barnes Metal Products Co., Chicago, Ill.
Berger Bros. Co., Philadelphia, Pa.
Globe Iron Roofing & Corrugating Co., Cincinnati, Ohio.
Milcor Steel Co., Milwaukee, Canton, Chicago, LaCrosse, Kansas City.

RINGS—FURNACE CASING

Forest City Foundries Co., Cleveland, Ohio.

ROOF FLASHING

Barnes Metal Products Co., Chicago, Ill.
Globe Iron Roofing & Corrugating Co., Cincinnati, Ohio.
Milcor Steel Co., Milwaukee, Canton, Chicago, LaCrosse, Kansas City.

ROOFING—IRON AND STEEL

American Rolling Mill Co., Middletown, Ohio.
Barnes Metal Products Co., Chicago, Ill.
Globe Iron Roofing & Corrugating Co., Cincinnati, Ohio.
Inland Steel Company, Chicago, Ill.
Milcor Steel Co., Milwaukee, Canton, Chicago, LaCrosse, Kansas City.
Newport Rolling Mill Co., The, Newport, Ky.
Republic Steel Corp., Youngstown, Ohio.

ROOFING—TIN AND TERNE

Berger Bros. Co., Philadelphia, Pa.
Milcor Steel Co., Milwaukee, Canton, Chicago, LaCrosse, Kansas City.
Newport Rolling Mill Co., Newport, Ky.
Republic Steel Corp., Youngstown, Ohio.

RUBBISH BURNERS

Hart & Cooley Mfg. Co., Chicago, Ill.

SCREWS—HARDENED METALLIC DRIVE

Interstate Machinery Co., Chicago, Ill.
Meyer & Bro. Co., F., Peoria, Ill.
Milcor Steel Co., Milwaukee, Canton, Chicago, LaCrosse, Kansas City.
Parker-Kalon Corp., New York City.

SCREWS—HARDENED SELF TAPPING SHEET METAL

Interstate Machinery Co., Chicago, Ill.
Milcor Steel Co., Milwaukee, Canton, Chicago, LaCrosse, Kansas City.
Parker-Kalon Corp., New York City.

SCREENS—PERFORATED METAL

Harrington & King Perforating Co., Chicago, Ill.

SCUPPERS

Aeolus Dickinson, Chicago, Ill.

SHEARS—HAND AND POWER

Dries & Krump Mfg. Co., Chicago, Ill.
Interstate Machinery Co., Chicago, Ill.
Marshalltown Mfg. Co., Marshalltown, Iowa.
Viking Shear Company, Erie, Pa.
Whitney Mfg. Co., W. A., Rockford, Ill

SHEET METAL SCREWS—HARDENED, SELF-TAPPING

Interstate Machinery Co., Chicago, Ill.
Parker-Kalon Corp., New York City.

SHEETS—ALLOY

Inland Steel Company, Chicago, Ill.
International Nickel Co., New York, N. Y.
Milcor Steel Co., Milwaukee, Canton, Chicago, LaCrosse, Kansas City.
Newport Rolling Mill Co., Newport, Ky.
Republic Steel Corp., Youngstown, Ohio.

SHEETS—BLACK, CORRUGATED, GALVANIZED

American Rolling Mill Co., Middletown, Ohio.
Granite City Steel Co., Granite City, Ill.
Inland Steel Company, Chicago, Ill.
Milcor Steel Co., Milwaukee, Canton, Chicago, LaCrosse, Kansas City.
Newport Rolling Mill Co., Newport, Ky.
Republic Steel Corp., Youngstown, Ohio.

SHEETS—COPPER

American Brass Co., Waterbury, Conn.
Revere Copper & Brass, Inc., Rome, N. Y.

SHEETS—COPPER BEARING STEEL

American Rolling Mill Co., Middletown, O.
Granite City Steel Co., Granite City, Ill.
Inland Steel Co., Chicago, Ill.

BUYERS' GUIDE

Milcor Steel Co., Milwaukee, Canton, Chicago, LaCrosse, Kansas City.
Newport Rolling Mill Co., Newport, Ky.
Republic Steel Corp., Youngstown, Ohio.

SHEETS—COPPER (LEAD COATED)

American Brass Co., Waterbury, Conn.
Revere Copper & Brass, Inc., Rome, N. Y.

SHEETS—IRON

American Rolling Mill Co., Middletown, O.
Granite City Steel Co., Granite City, Ill.
Inland Steel Co., Chicago, Ill.
Milcor Steel Co., Milwaukee, Canton, Chicago, LaCrosse, Kansas City.
Newport Rolling Mill Co., Newport, Ky.
Republic Steel Corp., Youngstown, Ohio.

SHEETS—MONEL METAL

International Nickel Co., New York.

SHEETS—NICKEL

International Nickel Co., New York.

SHEETS—PURE IRON COPPER ALLOY

Inland Steel Co., Chicago, Ill.
Newport Rolling Mill Co., Newport, Ky.

SHEETS—REFINED OPEN HEARTH IRON

American Rolling Mill Co., Middletown, O.

SHEETS—SPECIAL FINISH

American Rolling Mill Co., Middletown, O.
Inland Steel Company, Chicago, Ill.
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SHINGLES AND TILE—METAL

Globe Iron Roofing & Corrugating Co., Cincinnati, Ohio.
Milcor Steel Co., Milwaukee, Canton, Chicago, LaCrosse, Kansas City.

SKYLIGHTS

Globe Iron Roofing & Corrugating Co., Cincinnati, Ohio.
Meyer & Bro. Co., F., Peoria, Ill.
Milcor Steel Co., Milwaukee, Canton, Chicago, LaCrosse, Kansas City.

SNOW GUARDS

Berger Bros. Co., Philadelphia, Pa.
David Levow, New York, N. Y.
Rival Strap Corp., New York, N. Y.

SOLDER

Brown Wales Co., Boston, Mass.
Kester Solder Co., Chicago, Ill.
Milcor Steel Co., Milwaukee, Canton, Chicago, LaCrosse, Kansas City.

SOLDER—ACID CORE

Kester Solder Co., Chicago, Ill.

SOLDER—ROSIN CORE

Kester Solder Co., Chicago, Ill.

SOLDER—SELF-FLUXING

Kester Solder Co., Chicago, Ill.

STARS—HARD IRON CLEANING

Fanner Mfg. Company, Cleveland, Ohio.

STOKERS

Fire-King Stoker Co., Indianapolis, Ind.

STOVE PIPE AND FITTINGS

Meyer & Bro. Co., F., Peoria, Ill.
Milcor Steel Co., Milwaukee, Canton, Chicago, LaCrosse, Kansas City.

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Fanner Mfg. Co., Cleveland, Ohio.

STRAINERS—ROOF

Barnes Metal Products Co., Chicago, Ill.
David Levow, New York, N. Y.
Rival Strap Corp., New York, N. Y.

STRAPS—ORNAMENTAL PIPE

Barnes Metal Products Co., Chicago, Ill.
David Levow, New York, N. Y.
Rival Strap Corp., New York, N. Y.

TINPLATE

Berger Bros. Co., Philadelphia, Pa.
Brown Wales Co., Boston, Mass.
Granite City Steel Co., Granite City, Ill.
Milcor Steel Co., Milwaukee, Canton, Chicago, LaCrosse, Kansas City.
Republic Steel Corp., Youngstown, Ohio.

TOOLS—TINSMITH'S

(See Machines & Tools—Tinsmith's)

UNIT AIR CONDITIONERS

Andes Range & Furnace Corp., Geneva, N. Y.
Dail Steel Products Co., Lansing, Mich.
Forest City Foundries Co., Cleveland, O.
Henry Furnace & Fdry. Co., Cleveland, O.
Health-Air Systems, Ann Arbor, Mich.
Hess Warming & Ventilating Co., Chicago, Ill.
Lennox Furnace Co., Marshalltown, Iowa.
May-Fiebeger Company, Newark, Ohio.
Meyer Furnace Co., Peoria, Ill.
Motor Wheel Corp., Lansing, Mich.
Payne Furnace & Supply Co., Beverly Hills, Calif.

VACUUM CLEANERS—FURNACE

(See Cleaners—Furnace Vacuum)

VENTILATORS—CEILING

Hart & Cooley Mfg. Co., Chicago, Ill.
Henry Furnace & Fdy. Co., Cleveland, O.
Independent Reg. & Mfg. Co., Cleveland, Ohio.

VENTILATORS—FLOOR

Aeolus Dickinson, Chicago, Ill.

VENTILATORS—ROOF

Aeolus Dickinson, Chicago, Ill.
Berger Bros. Co., Philadelphia, Pa.
Burt Mfg. Company, Akron, Ohio.
Jordan & Co., Paul R., Indianapolis, Ind.
Meyer & Bro. Co., F., Peoria, Ill.
Milcor Steel Co., Milwaukee, Canton, Chicago, LaCrosse, Kansas City.

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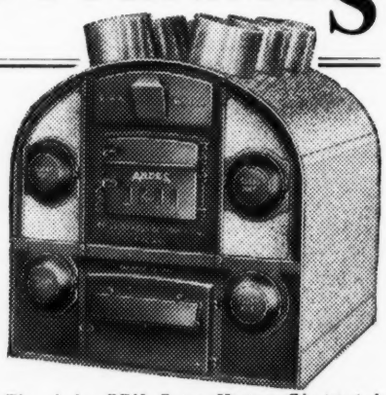

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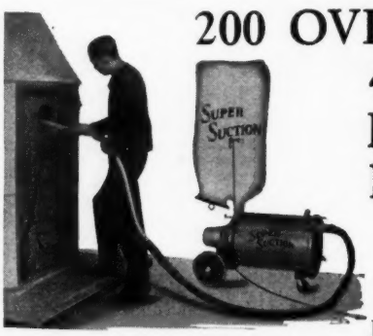

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With B Tools 151

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A-1 SHEET METAL WORKER, PLUMBER and heating man with Illinois and Wisconsin State license. Layout man on all lines. Prefer steady position by middle-aged man. Address Cal. W. Hurt, Box 384, DeKalb, Illinois.

SITUATION WANTED—BY SHEET metal mechanic experienced on general jobbing work, gutter and shop repair work, warm air heating; also pipe fitter. Address Key 143, "American Artisan," 1900 Prairie Avenue, Chicago, Ill.

SITUATION WANTED—GOOD SHEET metal plumber and furnace man open for good position. Can go to work at once. A1 references. Married. Address Key 144, "American Artisan," 1900 Prairie Avenue, Chicago, Ill.

SITUATION WANTED—BY RELIABLE heating and sheet metal worker. Long general experience in warm air heating, sheet metal work and plumbing. Can lay out heating systems of all kinds, figure and handle men. Neat and accurate with work. A-1 habits. Address Key 145, "American Artisan," 1900 Prairie Ave., Chicago, Ill.

SITUATION WANTED—LICENSED plumber, employed at present, desires steady position in small or medium sized town, Southern Colorado preferred. Address Key 128, "American Artisan," 1900 Prairie Ave., Chicago, Illinois.

ENGINEER

Correspondence solicited with manufacturer developing or producing air conditioning units, or with contractor specializing in fan heating. Twenty years' practical experience; member A. S. H. V. E., A. S. M. E.

G. A. VOORHEES, 633 So. Delaware St., Indianapolis, Ind.

SITUATION WANTED—CAN YOU MAKE use of this ability? Complete knowledge of and wide experience in every phase of warm air heating, selling, designing, installing. Thorough knowledge of every essential of repair work, advertising and sales promotion experience of high type. A good working knowledge of domestic air conditioning. Experienced in training and developing salesmen. Ready after April 20. Address Key 126, "American Artisan," 1900 Prairie Avenue, Chicago, Ill.

FOR SALE

NEW SKEL GAS STOVE AND COMplete demonstrating outfit, all for $25. Address Moser Brothers, Sabetha, Kansas.

FOR SALE—ONE OF THE BEST SHEET Metal shops in Iowa in one of the best towns in Iowa. Good business, little competition. A splendid opening for a good progressive sheet metal man. Address Key 142, "American Artisan," 1900 Prairie Avenue, Chicago, Ill.

FOR SALE—NEW CHRISTIE FURNACE cleaner used only on few jobs. Will sell at a sacrifice price. Address Frank Sehy & Son, 1206 So. Clay Avenue, Jacksonville, Illinois.

FOR SALE—ONE SETTING DOWN MAchine and stand. One adjustable 30" pipe folder. One large Buffalo groover. One combination pipe cutter and crimper. All the above tools are in good order, the first $50.00 check received will get at least $150.00 worth of tools. Jack Laurie, Churubusco, Ind.

FOR SALE—A 42" PEXTO AND WILCOX square shears, in good shape, complete with back and front gauges. Will take $50.00 cash. Address Key 136. "American Artisan," 1900 Prairie Avenue, Chicago, Illinois.

FOR SALE—ONE 30-SQUARING SHEARS, Good condition. Address Key 133, "American Artisan," 1900 Prairie Avenue, Chicago, Illinois.

LINES WANTED

MR. MANUFACTURER—DO YOU WANT California business? Aggressive salesman—Thoroughly familiar with heating and sheet metal industry is anxious to line up with good manufacturer who can use increased business from California territory. I have sold to both jobber and installer. Address Key 137, "American Artisan," 1900 Prairie Avenue, Chicago, Illinois.

LINES WANTED—EXPERIENCED FURnace salesman covering Iowa is open for some side lines on commission basis. Address Louis Roos, 1614 East 8th St., Des Moines, Ia.

WANTED TO BUY

WANTED TO BUY—ONE 8 OR 10-FOOT steel brake. Address Key 134, "American Artisan," 1900 Prairie Avenue, Chicago, Illinois.

WANTED TO BUY — OR TO RUN — A shop doing sheet metal and furnace work in a town in Minnesota or South Dakota. I am an A-1 man and would like to buy a shop if it were in a good town. Address Key 138, "American Artisan," 1900 Prairie Avenue, Chicago, Illinois.

WANTED TO BUY—A HEATING, Plumbing and sheet metal shop. Must be in Illinois and a good paying shop, no other need answer. Address Key 146, "American Artisan," 1900 Prairie Avenue, Chicago, Ill.

MISCELLANEOUS

PHILIP V. W. PECK

Patent and Trade Mark Law

Barrister Bldg., Washington, D. C.

FULL SIZE PATTERNS FOR BOATS

Building up-to-date Outboard Boats, Canoes, Hunting and Fishing Boats with our full size paper patterns.

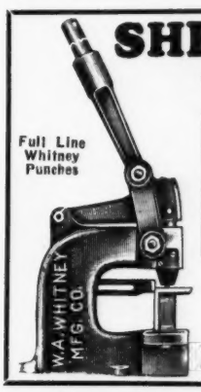
Sectional or One-Piece

Write for Free Illustrated Folder No 11

H. F. THOMPSON Boat and Pattern Works
Decorah, Iowa. Dept. A.

SHEET METAL MACHINERY

COMPLETE STOCKS — NEW & USED — HAND OR POWER — ROLLS— SHEARS—BRAKES—PRESSES—FOLDERS—STAKES—DRILLS



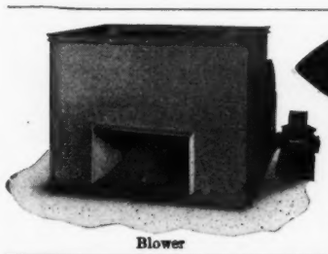
This Week's Specials

5—No. 2 Whitney Punches, each .....$ 7.00
Chi. Steel Brakes, all sizes, 3' to 12'
3—30x2 Plain Rollers, each 10.50
30" Groover, geared.....$25.00
2—30" Bar Folders, each.. 25.00
Nia. Heavy Hulbert Seamer 40.00
10 ft. Power Shear 14 ga. Motor Drive.....$650.00

We Recondition and Guarantee All Machines

Send for Bulletin C-2

INTERSTATE MACHINERY COMPANY
130 S. Clinton St. CHICAGO


Blower

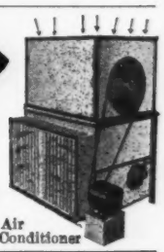
Air Conditioning

The Health Air Blower A Complete Air Conditioner

for New or Old Installations

Low Priced ***Write for our Attractive Proposition*** **Efficient**

HEALTH AIR SYSTEMS, 1105 N. Main St., Ann Arbor, Mich.


Air Conditioner

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LOOK FOR PROFITS IN *Known Quality*

THESE are the times when it doesn't pay to play with makeshifts. People want genuine quality — honest VALUE — and they are seeing that they get it.

And this applies to SHEET METAL.

Today, as never before, there is an opportunity for sheet metal men to establish a substantial and paying business on GLOBE BRAND Sheet Metal Building Products. For 47 years, the name GLOBE has stood for faithful, economical service. Globe Products invariably render such service because of the metal which gives GLOBE its dependable quality.

GLOBE Products are under ONE CONTROL throughout every process of manufacture from the production of the metal to the finished article — your positive assurance of quality.

Now, as never before, look for Profits in *known quality*. You can't go wrong with GLOBE.

Adequate Stocks always ready for Immediate Shipment

GLOBE TRADE MARK BRAND

SHEET METAL Building Products

THE GLOBE IRON ROOFING & CORRUGATING COMPANY, Cincinnati, Ohio

Fabricators of Zinc Institute—Seal of Quality—Two Ounce Coated Galvanized Corrugated Roofing

CYRUS H. K. CURTIS

***President*, The Curtis Publishing Company**

● "The Audit Bureau of Circulations has probably done more to stabilize the advertising business than any other agency has ever done or attempted to do, and in the course of years it has strengthened itself and secured the confidence of advertisers to such an extent that its activities at the present time are indispensable."

Cyrus H K Curtis

LEE W. MAXWELL

***President*, The Crowell Publishing Company**

● "I feel that the organization of the Bureau was a great step forward in putting advertising on a much sounder basis. There is no question but that it has been an important factor in creating greater confidence in advertising and in advertising media on the part of American business men. I am glad to realize that our company has been a supporter of the Bureau from its inception."

Lee W. Maxwell

● What a fortunate thing that advertising undertook, and today successfully does, the needed regulatory work of advertising.

Of the moves through which advertising won the confidence of business, this is one of the greatest. It began sixteen years ago—with the foundation of the Audit Bureau of Circulations.

Ever since its inception, men who have built the publications of America—men in whose publications business expends millions of dollars for space—have fostered the work of the A. B. C. Their cooperation has made it possible to place in the hands of all purchasers of space, the means to a sound, reliable measure of values.

How many in advertising today fully use this positive protecting power the Bureau makes available?

Hundreds do, of course. But additional hundreds, the Bureau believes, are not as yet guarding the appropriation this sure way.

It is valuable information—that contained in the Bureau's Audit Reports. And the whole story never is told on the first page of the report. On the inside pages are facts and data everyone buying space has a right to know.

Reports of the Bureau cover almost every important publication in America. Publishers expect and want men buying advertising to use them.

As a recognition of service, not only publishers and agencies, but a distinguished group of advertisers, hold membership today in the Audit Bureau of Circulations.

An advertisement by the
AUDIT BUREAU OF CIRCULATIONS
Executive Offices . . . Chicago

A VETERAN GIVES HIS VERDICT...

Of all the professions or trades which specify or use metal sheets, none know sheet metal better than those who work it.

Edward F. Penney, New Bedford, Mass. has been a sheet metal contractor for more than 50 years and is still active in the business at the age of eighty. Surely his opinion is worthy of consideration—"I have been using Toncan Iron for 18 years and will use no other. It is soft and very easy to handle. If the seam is not right you can turn it back and turn again, and in forming furnace pipe you can form it just as you want it."

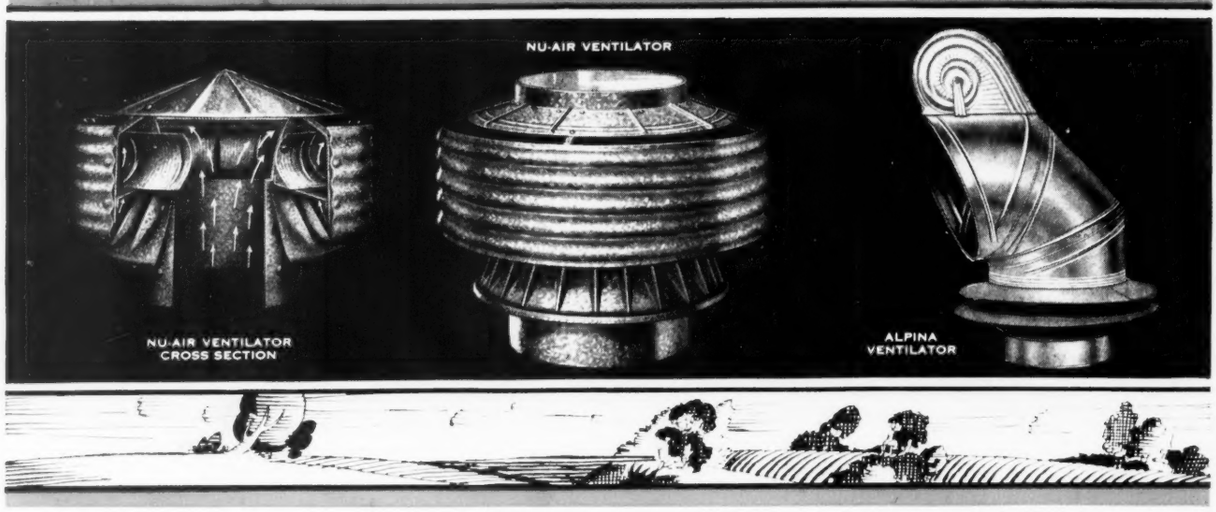
Toncan Iron is a rust-resisting alloy of refined iron, copper and molybdenum. It is unusually ductile, easy to form and saves labor costs. The contractor who uses it builds his prestige by giving his customers the best material they can buy in its price class.

Write for a copy of a new 64-page book—"The Path to Permanence."

REPUBLIC STEEL CORPORATION

GENERAL OFFICES YOUNGSTOWN, OHIO

MILCOR Skylights *and* Ventilators *represent the very latest* design . . .



ONE of *Milcor's* most popular skylights . . . "The Torpedo" Ventilating Type. Effective as a ventilator and an ideal source of light. By a simple controlling mechanism, a movable shutter quickly and easily regulates the amount of ventilation. Equipped with automatic fire-proof feature. *Milcor* skylights are made in a variety of shapes . . . some with the glass laid in putty and others having the *Milcor* "Puttyless" design.

There is also a range of selection in *Milcor* Ventilators . . . to meet particular needs. *Milcor* "Nu-Air" Ventilators have an unusually large capacity for exhausting impure air. No down draft regardless of height of ventilator and direction of wind. Furnished with steel or wired glass top. Alpina Revolving Syphon and the *Milcor* Uno Turbine Ventilators have remarkable efficiency. Sensitive to air currents . . . revolve on bearings completely enclosed.

MILCOR STEEL COMPANY

MILWAUKEE, WIS., 4117 W. Burnham St. CANTON, OHIO
Chicago, Ill. Kansas City, Mo. LaCrosse, Wis.

Sales Offices: New York at 100 E. 42nd Street; Boston, Mass. at 176 Federal Street; Atlanta, Ga. at 504 Bona Allen Building; Los Angeles, Calif. at 7267 Clinton Street; Little Rock, Ark. at 104 W. Markham St.

MILCOR PRODUCTS

Copper Alloy Steel — Reg. U.S. Pat. Off.

Save with Steel